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Ironfounding Changes

At the annual conference of the Institute of British Foundrymen held in London last week, two very important announcements were made. The first was that His Majesty had been pleased to give his approval to the granting of a supplementary charter for the Institute. The implications of this will gradually unfold themselves during the next few years, but the general tendency will be to restrict admission to the Institute to those who qualify either by real standing in the industry or by examination. The rules and regulations will have to be created to take care of the new situation. It may involve the creation of an examination organisation, which will entail a good deal of hard work. When this is established, it will mean that membership and associate membership will carry with it a cachet of real significance. Whether such steps are desirable, time alone will show. In the past, many people quite incapable of passing technical examinations have made the greatest contributions to the progress of the Institute and indirectly to the industry.

The second announcement of profound importance is the change in the structure of the British Cast Iron Research Association. Until this year, the Association has been financed by the collection of annual subscriptions from member firms, by donations and by Government grants. Now all this is to be changed, and the industrial revenue will come through the Joint Iron Council, which body will create the necessary funds through a levy on pig iron. We presume there will still be some form of membership but at much reduced fees, but under the new scheme every ironfounder automatically becomes a member and will receive the results of research. This being so, it behoves those many hundreds of smaller concerns to put themselves in a position to get the best from research results. To achieve this, the first thing is to establish personal contact with the staff, either by a visit to the headquarters at Alvechurch, near Birmingham, or to receive a call from a member of the Association's development department. Then they must participate in the affairs of the Institute of British Foundrymen, for thereby they will acquire the habit of thinking along technical lines and of meeting with people who can and will help them. The foundry industry, as we have so often pointed out, consists of thousands of people interested in the manufacture of castings, yet a mere handful of these are truly competitors. From this vast reservoir of knowledge there is but a tiny part which cannot be freely communicated to all and sundry. That is probably why it is such a friendly industry!

There are to-day but few foundries which are really isolated from local technical activities, and the plans now being studied by the Council of the Institute, together with nation-wide service from the Research Association, should engender a community of interests of lasting benefit to the manufacturer of iron castings. An obvious gap at the moment is Ulster, and we hope to see the day when Belfast will organise the local technicians into a coherent body. We welcome the newcomers, they enter the field of research with a rich inheritance, and we trust they will show their appreciation by enthusiastic participation.

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Presentation to Mr. V. C. Faulkner

The Supper Dance and Cabaret which closed the Annual Conference of the Institute of British Foundrymen, held at the Café Royal, was interrupted to allow Mr. Barrington Hooper, C.B.E., to present to Mr. V. C. Faulkner an F.G. de luxe stamp album and a draft on H. R. Harmer of Bond Street, with which to make purchases. The album was inscribed, "Presented to Vincent C. Faulkner by the Proprietors of the Foundry Trade Journal in recognition of his loyal and talented editorship of that journal during the last 28 years—June 11, 1948." In making the presentation, Mr. Hooper recalled that before being appointed Editor, Mr. Faulkner was well known as a pioneer of the electric steel making process. In 1924 he presided over the London Branch, and in 1926 was elected the national president. He was a founder of the "Equipment" Association and the Institute of Vitreous Enamellers. His work for the Institute, which he joined 40 years ago, was recognised by the award of the Oliver Stubbs' Medal. This year he was president of the International Committee of Foundry Technical Associations, and it was also to commemorate that fact that Mr. Hooper and his co-proprietors had chosen the occasion for the presentation.

Mr. Faulkner, after thanking Mr. Hooper, said that any success he had achieved had been largely due to the help he had received from his personal staff. As an Editor, he especially appreciated the freedom he always had received to express his policies, a feature much cherished in democratic countries.

Anglo-Belgian Dinner

The Council of Ironfoundry Associations last Thursday were the hosts to the important delegation of Belgian foundrymen participating in the annual conference of the Institution of British Foundrymen. Mr. FitzHerbert Wright presided, and speaking in French, welcomed the guests and thanked the various Belgian foundry associations for the hospitality which was invariably accorded to Britishers visiting their foundries. Mr. P. de Keyser, the secretary of the Belgian Foundry Employers' Federation, replied in English. The gathering was also addressed by Mr. F. A. Martin, president of the British Steel Founders' Association, Mr. Léonard, Mr. John Gardom, and Mr. V. C. Faulkner. Amongst those present were Mr. C. Monseur, Mr. Foulon, Mr. Fasotte, Mr. Barrington Hooper, C.B.E., Mr. A. J. Murphy, Mr. V. Delport, Mr. T. A. Hammersley, Dr. Everest, Mr. Kenneth Marshall, Mr. R. L. Handley, Mr. Bairiat, Mr. E. Cambier, Mr. Dewier, Mr. A. Pearce, Mr. J. G. Pearce, Mr. Halbart, Mr. Verhaegen, Mr. Verstraeten, Mr. F. W. Rowe, Mr. F. Arnold Wilson, Mr. D. H. Wood, and Mr. P. T. Holligan. The function was organised by Mr. T. Parkinson, secretary of the C.F.A.

ON JULY 7 there will be an informal meeting of the Association of Bronze and Brass Founders at the Victoria Hotel, Wolverhampton, commencing at 12.45 p.m.

Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

BRITISH SAND RESOURCES

To the Editor of THE FOUNDRY TRADE JOURNAL

SIR,—In your issue No. 1,657, dated 3rd inst., I observe a letter from Mr. Archibald Jamieson of The Argus Foundry, Limited, Thornliebank, near Glasgow. I think Mr. Jamieson would find a lot of useful information in the Paper issued by the Iron & Steel Institute about the end of 1946 or early 1947, *viz.*,

"The Fundamental Characteristics of Moulding Sands," by Mr. W. Davies, Ph.D., M.Sc., F.G.S., of the University of Sheffield.

The Paper is No. 20/1946 of the Steel Castings Research Committee (submitted by Dr. W. J. Rees through the Moulding Materials Sub-Committee.

Yours faithfully,
S. G. THROSSELL,
N.W. Area Manager.

General Refractories, Limited,
9, Albert Square, Manchester, 2.
June 4, 1948.

Cerium

As the ironfoundry industry is now interested in this metal, it is germane to draw attention to a theoretic study—*Etude des Transformations Allotropiques du Cérium Pur et d'un Cérium Industriel*—by Mr. F. Trombe and Mr. M. Foex, which is printed in the November-December issue of "Revue de Metallurgie," which has just arrived in this country.

THE IRON AGE reports that pairs of large-size cupolas working for 98 hours continuous working are providing open hearth furnaces with liquid iron at a price competitive with that of cold pig iron.

MR. F. A. QUINN is visiting the United Kingdom to buy machine tools, earth-moving equipment, materials-handling equipment and Diesel generating plant. He will be staying for three months and his address will be c/o the Bank of New South Wales, 47, Berkeley Square, London, W.1.

THE ANNUAL GENERAL MEETING of the Arc Welding Electrode Section of the British Electrical and Allied Manufacturers' Association was recently held at the Holborn Restaurant. Mr. W. W. Watt, Managing Director of the British Oxygen Company, and the Quasi-Arc Company, Limited, was again elected Chairman of the Section, and Mr. R. E. Clipsham, Managing Director of Lincoln Electric Company, Limited, was elected Vice-Chairman. Dr. J. H. Paterson, Managing Director of Arc Manufacturing Company, Limited, was elected Chairman of the Technical and Production Committee, and Mr. E. S. Waddington, Manager of the Industrial Division Philips Electrical, Limited, was elected Chairman of the Committee.

The "Edward Williams" Lecture

Solved and Unsolved Problems in the Metallurgy of Blackheart Malleable*

By Dr. H. A. Schwartz

When you honour a speaker with an invitation to deliver such an address as this you no doubt expect that he should deal with a field with which he has had more than transitory contact. Some 45 years' connection with the manufacture of American or "blackheart" malleable have prompted the selection of the present subject.

There is, perhaps, some historical justification for the address to a British audience on the subject of blackheart malleable by one long associated with the National Malleable and Steel Castings Company. The introduction of blackheart malleable into Britain was largely the result of collaboration, perhaps 60 years ago, between Sir Francis Ley, of Derby, and Alfred Atmore Pope, for a long time President of National and of some of its corporate predecessors.

You have apparently been more interested in whiteheart malleable than in blackheart. Whiteheart malleable has no commercial significance in America, even though we produce about one million tons of blackheart malleable a year. Lately your literature reports work very pertinent to our problems. Much of this emanates from the Cast Iron Research Association. Since we are concerned with the control of decarburisation while you have mostly been interested in its promotion, we find much novelty in what Jenkins and others have done in England in this field.

You will, no doubt, have inferred from this introduction that the lecturer's interest is much more with regard to metallurgical principles than in the details of plant operation or equipment.

Physical Requirements

The ultimate object of the American industry is to produce metal of the quality required by the A.S.T.M. specifications for tensile strength which shall be machinable at high cutting speeds and which can be produced by the most economical methods. Obviously some compromise may be required. In addition to cupola malleable and the pearlitic type, the A.S.T.M. recognises two grades of malleable iron. These are designated by code numbers 32510 and 35018 respectively. The first three figures indicate the yield strength (in hundreds of pounds per square inch); the last two figures indicate the elongation. The two grades are required to have tensile strengths of 50,000 and 53,000 lb. per sq. in. respectively (22.3 and 23.7 tons per sq. in.).

These numbers are, unfortunately, not the result of well-founded research but represent really a consensus of well-informed opinion. It is well known that there are considerable variations in tensile strength corresponding to a given yield strength and also in the tensile strength-elongation relation. Since the American product is, in general, almost completely free from combined carbon and since the yield ratios do not seem related in any way to composition, this represents the first unsolved problem. One may wish to consider that up to the yield point the deformation is largely elastic and a change of volume may be occurring, whereas between the yield strength and the tensile strength the deformation is largely plastic and unaccompanied by a change of volume.

A second unsolved problem is the observed fact that metal containing a considerable amount of pearlite varies considerably in elongation for similar amounts of combined carbon. In this connection one is left to consider the effects of decarburisation of surface metal on the apparent ductility of the alloy.

The form of the graphite aggregate, a field in which Morrogh's work may be a most important guide, may also be of importance in explaining the above anomalies. It is surprising, but probably well established, that malleable iron, the graphite of which is in relatively few large nodules, is more ductile than the identical metal so treated as to contain perhaps one thousand times as many nodules, and quite dense ones at that.

Tensile Strength and Graphite

It is entirely plausible that the tensile strength of malleable should be a function of the amount of graphite present. Yet the change in tensile strength produced by small changes in graphite content in the general region of 2½ per cent. carbon may be at the rate of 12,000 lb. per sq. in. per 1 per cent. carbon in some operations and 29,000 lb. per sq. in. in others. Originally we were satisfied with the gross conclusion that there was a direct relation. Now we must seek an explanation of the quantitative difference. The effect of graphite on the modulus of elasticity of malleable iron is almost exactly in proportion to the amount present. The correlation of this modulus with density is of a very high order indeed. Again we may have a manifestation of the maintenance of constant volume for plastic deformation and an alteration of volume in the elastic range. Perhaps we should consider such effects, and hence a graphite form. A relation to form is plainly evidenced by the fact that the effect of a given amount of graphite in grey iron on the modulus

*Delivered for the Author by Mr. A. E. Peace at the London Conference of the Institute of British Foundrymen.

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of elasticity is very different from the effect of the same amount on malleable iron.

The effect of elements other than carbon upon the mechanical properties of completely ferritic malleable has at last been brought into some kind of order. In blackheart malleable, the sulphur is all present in combination with manganese. It is difficult to obtain any large mass of data which may be supposed to represent a single universe for statistical study of the effect of manganese sulphide. By selection of some appropriate groups, however, and by intercomparison, it has been shown that, volume for volume, manganese sulphide affects the properties by something of the same order of magnitude as graphite.

Statistical studies as to the effect of manganese, chromium, silicon and phosphorus have been made based on thousands of analyses. One actually determines, of course, the rate of change of strength with concentration. Extrapolation to pure iron yields impossible values. Furthermore, the effect of silicon as determined by these statistics is a decrease in tensile strength, a result not to be anticipated from the solution of an element in ferrite.

Analogy with Medium Carbon Steels

Work on medium carbon normalised steels has finally unearthed a systematic treatment of the fact that the effect of a given change of concentration of a specific element depends upon the concentration of all the elements present. Empirically it is true that, if the effects of all the elements present be summed up, assigning to each a potency which has been experimentally determined, then the actual tensile strength is a probability function of the number so obtained. This means that the effect of a given change of composition is not a function of the existing composition, but of the existing tensile strength; the latter not directly proportional to composition.

This reasoning was transferred to malleable iron on the basis of a comparison of the micro-hardness of its ferrite and of certain synthetic ferrites containing certain concentrations of the elements. A simple treatment was found to be the expression of the effect of each alloy on hardness in terms of an equivalent amount of silicon followed by a graphic representation of ferrite hardness in terms of equivalent silicon. The relative effect of given concentrations of two elements dissolved in ferrite is in a constant ratio within the range of these experiments.

A translation into effect on malleable iron still has an imperfection for, plainly, since statistically there is no doubt that silicon is a weakener, we are confronted with a strengthening effect in ferrite. This is very probably due to an increase of sprawliness of graphite. It might be that a study of the effect of silicon on the tensile strength of whiteheart malleable, in which apparently graphite is always spherulitic, would throw further light on this reasoning. There are those who have thought that silicon could be present in malleable as the element, an idea for which the lecturer has seen no evidence.

Hydrogen in Malleable

An unsolved mystery is how hydrogen can affect the properties of malleable. The hydrogen content of all malleable iron is practically the same, having come to equilibrium in the annealing process. The mechanical properties of the product seem to bear some systematic relation to the hydrogen content of the hard iron. Attempts have been made to explain the effects of various elements on the properties of ferrite in terms of atomic sizes or configuration with entirely negative results.

As a practical matter, there is little importance to be attached to elements other than carbon, as far as engineering properties are concerned. Few subjects, however, have so interested the experimentor as their influence on graphitising rate.

The mechanism of first-stage graphitisation, that is, above the critical point, seems to be quite well established. Details may require further study. It can be said with considerable certainty that graphitising rate is always determined in the beginning either by the linear crystallisation velocity of graphite or the rate of solution of cementite. The former is the usual condition, but there is evidence which can be interpreted as a retardation of cementite solution by the presence of the sulphide films first reported by Levy. After but little graphite formation, the determining factor as to reaction rate is the migratory rate of carbon in austenite. To a limited extent, when graphitisation is nearly complete, the rate of decomposition of the carbide governs.

Initiation of Graphitisation

Largely because it is no longer usual to begin graphitisation below the critical point, less attention has been given to the initiation of graphitisation at such temperatures. Above A_1 the conditions have been expressed in the form of equations. These are somewhat complicated and incidentally represent about 1,500 man-hours of desk work in their derivation and checking. The mechanism by which graphitisation is completed with liberation of ferrite is of enormous industrial importance. A major handicap in its theoretical elucidation long lay in the lack of appreciation of the fact that it actually occurs in two stages. One is a very rapid one, occurring between the A_1 stable and A_1 metastable temperatures and involving the conversion of austenite into graphite and ferrite. This process may perhaps be so fast as to make its stepwise study difficult. It is about ten times as fast as is the reaction just above this range and about one hundred times as fast as that just below it. Given even a reasonable cooling rate, graphitisation can be entirely completed by the time the temperature falls below the metastable critical point.

If this procedure be adopted, there is no need for information as to completion of the reaction at lower temperatures. If not, the problem is not concise, unless we consider the sudden cooling of an alloy in equilibrium above the critical range to a temperature below that range. This condition has practical application,

mainly in the making of "pearlitic" malleable. In this special case the problem could, perhaps, be approached very much by the same principles used in studying primary graphitisation above the critical range.

Graphite Nodules

One of the numerical constants in the graphitising rate equations is the number of nodules per unit volume. Be it noted in passing that, although there is a general relation between the number per unit area and unit volume, the latter is the characteristic figure. In the field of what determines this number there is still much to be learned. Morrogh teaches that graphite crystallises on sulphide inclusions. Admittedly this is frequently so, but it is certainly not true that the number of nodules equals the number of such inclusions. White cast iron quenched from, say, 1,000 deg. C. and then graphitised, has many hundred, or even several thousand, times as many nodules per unit volume as when graphitised without pre-quenching. There is no reason for believing that the preliminary treatment alters the number of sulphide inclusions. Furthermore, many sulphide inclusions are found about which no graphite has grown, and, on the other hand, there are graphite inclusions in which one can see no sulphides. The latter may perhaps, be an oversight in that the microscopic plane does not pass through the small sulphides in the larger graphite nodules.

It has been shown that graphite nodules first form, certainly preferentially, and perhaps always, at cementite-austenite interfaces, and the area of this interface is increased by precipitation, during reheating, of cementite particles from martensite produced in quenching. It appears that the formation of martensite is necessary to make the process effective. Sulphide and other inclusions have some tendency to precipitate on this same interface. Since all of the determining factors enumerated for the beginning of graphite growth represent areas of high energy state, it may perhaps be true that these states themselves are the determining factors in starting nucleisation.

Temper Carbon

The form in which temper carbon occurs has already been frequently referred to as of major consequence. Having no contact with irons containing iron sulphide, we, in America, first learned of the existence of the dense spherulitic type of nodule from British publications and by the examination of samples of British origin. We did know that when temper carbon is formed, and grows at high temperature, the number of nodules is greater and they are more sprawly than if graphitisation takes place at lower temperatures. We have also demonstrated that temper carbon initiated and growing below the A_1 point is in quite spherical masses, which, however, are not as dense and have not the high order of crystallinity as the spherulitic inclusions in your whiteheart malleable. Furthermore, it is known that the addition of tellurium promotes the formation of dense temper carbon which is not spherulitic, although approximately equiaxed.

Graphitisation is, in large measure, influenced by the composition of the hard iron. We know that with the exception of that of vanadium, the carbon compound (or iron-carbon compound) of which is stable at all temperatures, the effects of alloying elements is much more marked below the critical point than above. Palmer has recently substantiated this point. There is little completely convincing knowledge as to the mechanism by which composition alters graphitising rate, when it does not, as in the case just mentioned for vanadium, merely introduce a corresponding amount of a stable phase. Silicon, nickel and manganese (except as sulphide) and chromium, are in considerable part contained in the carbide phase, and molybdenum entirely so. Copper could not be studied by the techniques used. Further investigation is lacking, but it appears likely from the general character of X-ray spectra that these elements merely substitute atom for atom, for iron, and do not form new compounds. Indeed, there is evidence that at temperatures above A_1 cementite is no longer Fe_3C, but first becomes richer in carbon, approximating Fe_2C, and then poorer. The type of crystal lattice is unaltered and the lattice is apparently stable irrespective of the exact number of carbon atoms which it contains.

Sulphide Films

Many years ago, Levy reported the formation of iron sulphide films in and around cementite particles. The pictures were not completely convincing, and the lecturer has never found an observer who claims to have seen these structures. Nevertheless, the presence or absence of allotriomorphic sulphide films would explain many things. A sulphide phase separating from the alloy during freezing, while the sulphide is liquid, will produce an allotriomorphic film of the sulphur compound. If the freezing point of the sulphide complex is above that of the parent metal, it will separate as a liquid drop or as a crystal and be present ideomorphically. The presence or absence of allotriomorphic sulphides will, however, explain many experimental observations. We lack much data regarding free energies of formation, but it is fairly reasonable to suppose that the stability of the sulphides is in the following order: iron, manganese, tin, cerium and lanthanum. It is also reasonably certain that the melting point of iron and tin sulphides are below that of the iron and the others above. If iron sulphide be present, graphitisation is retarded (allotriomorphic phase). If manganese is added, graphitisation goes on (ideomorphic stable MnS). If tin is now added, graphitisation is retarded (the still more stable tin sulphide being allotriomorphic). Adding a rare earth restores graphitisation (ideomorphic stable sulphide. Selenium and tellurium are, to some extent, equivalent to sulphur. Many graphitisation accelerators, silicon, aluminium, zirconium and titanium are also deoxidisers, and until experiments are made with completely deoxidised metal, it may be argued that it is absence of oxygen rather than presence of these elements that produces the result.

The argument would appear to be invalid in the case of silicon, the only one of the series the effect of which is known as a function of concentration. The graphitising rate is multiplied equally by equal increments of silicon throughout the entire useful range, which is

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scarcely compatible with a deoxidisation theory. Nickel and copper are fairly good accelerators and can scarcely be thought of as deoxidisers. Aluminium, zirconium and titanium are potent in extremely minute concentrations of the order of a few hundredths of one per cent., which makes the mystery all the greater. Nucleisation, possibly by the oxides of these metals, is suspected, but preliminary surveys seem to show that acceleration is produced without marked increase in nodule number.

The retarding effect of chromium, manganese or molybdenum could be ascribed to a stabilising effect on the iron carbide were it not for the fact that graphitisation appears still to be controlled in rate by the migratory rate of carbon. Perhaps ultimately the atomic physicists will be able to tell us of a mechanism by which these elements, which are prone to combine with carbon, should also retard its migration. Retarding of graphitising by hydrogen is known to be accompanied by some decrease in nodule number, but also the rate of growth of nodules is retarded. There remain the alternatives of a decrease in the migratory rate of carbon through the gamma lattice containing interstitial hydrogen atoms, or a decrease in surface per unit volume. The known acceleration by carbon of hydrogen diffusion in low carbon steels does not appear to suggest a retardation of carbon diffusion by hydrogen.

Influence of Boron

The element boron is of peculiar interest. In concentrations of a few thousandths of one per cent., it greatly accelerates graphitisation without any initial marked effect upon nodule number. Above some 0.003 per cent. the nodule number begins to increase suddenly and enormously. The effect on graphitising rate decreases in intensity, but is still marked in the region of 0.10 per cent., although with marked deterioration of quality. Concentrations of 1 per cent. or so completely inhibit graphitisation and, strangely enough, white cast irons of conventional composition to which such amounts of boron are added, have the metallographic appearance of a hyper-eutectic iron/iron-carbon alloy. For academic reasons an exploration of the X-ray spectroscopy of the boron-carbon iron alloys should be undertaken, although there is no particular practical need for such knowledge.

Primarily, graphitisation during freezing is, of course, to be shunned like the plague. Laplanche has lately greatly improved our knowledge of the carbon-silicon ratios necessary to control this factor. He greatly systematised our understanding and interpretation of earlier American observations, and has, it is to be hoped, disposed for good of the fallacious diagram of Maurer which had been ignored by malleable metallurgists because of its evident lack of utility. Other elements than silicon which are normally present in blackheart malleable seemed to have little effect on primary graphitisation, although this is not true of the active graphitisation promoters such as aluminium. Incidentally, alloys containing several per cent. of aluminium are ungraphitisable.

The Question of Ambient Gases

It may occasion surprise that the ambient gases can greatly alter the graphitising rate of a given white cast iron. Taking the graphitising rate *in vacuo* as standard, graphitisation in hydrogen, or in gases which, at annealing temperatures, dissociate with liberation of hydrogen, definitely retards graphitisation. The facts with regard to atmospheres initially containing anhydrous ammonia are well established and observations on hydro-carbons, such as acetylene, for example, which dissociate into the elements, indicate a similar trend. Nitrogen and argon, and presumably also the other inert gases, behave like a vacuum, but mixtures of CO_2 and CO, although not either gas alone, promote graphitisation. Honda and Murakami suggested in a British publication that all graphitisation took place by the alternate oxidation of the carbon of cementite by carbon dioxide and the deposition of graphite from the resulting carbon monoxide with resulting re-formation of the higher oxide. The ability to graphitise in the absence of oxygen speaks against this hypothesis.

A very pure iron-carbon alloy containing about 0.75 per cent. of combined carbon, when heated at a temperature a little below A_1 for some three months in pure argon at approximately atmospheric pressure, lost a major part of its carbon. A metallic grey powder found in the tube, which may very well have been graphite, was unfortunately not identified as such either chemically or by X-ray spectrograph. There seems here to be clear evidence that the free energy of graphite not embodied in ferrite is less than the free energy of that substance *in situ* in iron. An effect of pressure of the metal on included graphite may be suspected.

It has been noted that an increase in pressure on a CO-CO_2 atmosphere, which should favour the decomposition of carbon monoxide into carbon dioxide and carbon, has been observed to accelerate graphisation above the critical point, but in the case of the particular gas compositions used, a pressure of a few atmospheres completely suppressed sub-critical graphitisation. It is quite difficult to suggest an explanation. Even if, at high pressures, the lines marking equilibria of CO-CO_2 mixtures with graphite and cementite respectively, as a function of temperature, intersect in the region of 700 deg. C., there still remains the question of how a pressure on the outside of a piece of metal has an effect near the centre of the $\frac{7}{8}$-in. dia. specimens on which the observations were made. The question received some light from the fact reported by the investigator that graphitising appeared to be inhibited more in the "second stage" near the surface of the casting than near the centre.

Surface Decarburisation

The effect of the surrounding gas upon decarburisation and the production of low carbon rims which graphitise with difficulty, is another matter. The formation of decarburised rims is desirable, especially in high carbon iron, from the viewpoint of increasing elongation. Deterioration of graphitisation is, of course, objectionable.

The subject has been studied somewhat thoroughly only where the carbon is removed by oxidation. Re-

moval by hydrogen is also possible, it having been shown that at as low a temperature as 200 deg. C. hydrogen purified by bubbling through the liquid alloy of sodium and potassium, removed carbon readily from white cast iron. The particular hydrocarbon formed was not identified, but was presumably methane. The work of various investigators with regard to the equilibrium constants of the reaction between carbon, as such, or as cementite, hydrogen and methane, suggests that decarburisation is possible at temperatures where the hydrocarbon is fairly unstable. Since the use of hydrogen would, of itself, retard graphitisation, the reaction with this gas has been of less interest than that with CO-CO_2 mixtures.

In this field you, in Britain, who wish to produce decarburised castings without scaling, have made more progress than we have in America. We have done little on the matter of rate of carbon removal, and if I understand the published work, then you have been in a position to conclude that primarily, a diffusion of carbon in iron is involved. This seems to be true with the limited degrees of decarburisation in which we have been interested.

We were quite surprised to find in our own work that ferrite rims could be formed at temperatures above the A_1 point of the parent alloy. Further investigation showed that they did not form above the A_3 point of the alloy in its decarburised state. We were earlier aware that carbon would not migrate from a high-carbon iron into approximately pure ferrite at temperatures below the latter's A_3 point. It would now seem that, within the depths of ferritic rims with which blackheart practice concerns itself, say from 0.01 in. to 0.10 in., the migration rate of carbon in alpha iron must be enormously rapid as compared with its migration in gamma iron, in order that carbon may have migrated through this zone to the exterior under an extremely small gradient. Comparing this with the experiment mentioned just before, it may be that the diffusion into ferrite below its A_3 point was so fast as to produce very wide zones in which decarburisation was at so low a concentration as to escape detection by the microscope.

For a considerable time it seemed that in the presence of ferrous oxide, under conditions which should ensure the formation of an atmosphere in equilibrium therewith, the commercial white irons still oxidised, converting iron into one of its oxides. This anomaly was, however, traced to the great tendency of ferrous oxide to absorb oxygen at room temperature. Precautions to ensure the absence of higher oxides resolved the difficulty. It now appears that the silicon, manganese and other elements present in normal practice do not, at least to any great extent, alter the equilibria between CO, CO_2, Fe and FeO. These equilibria, including those involving the presence of carbon as cementite, have as you know, been thoroughly investigated at length, and the lecturer's present thought is that there is little need to carry that portion of the work into investigations of the impure alloys of commerce.

Silicon and the Sub-scale

Oxidation of silicon in silicon steels has been the subject of study, and similar experimentation is being carried forward on white cast iron. It appears that any conditions which result in the formation of ferrite rims are likely to result also in the formation of a layer called "subscale" by some workers. This is a layer which contains silicon dioxide, or perhaps a silicate, partly as a cloud of particles in the ferrite and partly on the grain boundaries.

Carbon will not migrate into this subscale at temperatures at which it migrates into what was the ferrite zone. At least one worker has put forward as an explanation the blocking of migratory paths by these inclusions. The idea warrants further attention even though grain boundaries parallel to the surface seem to have perhaps less inclusions than those perpendicular to the surface.

The formation of subscale requires the presence of silicon. If silicon be present, then under given constant conditions the thickness of the scale increases as the square of the time, but in iron differing in silicon content at a given temperature and with a given gas phase, the subscale thickness varies inversely as the silicon content, suggesting an exhaustion of the gas activity by reactions with that element. All white cast irons contain sonims, which at least after ignition to remove carbon, are complexes of Fe_2O_3, Mn_3O_4, P_2O_5 and SiO_2. After annealing, the amount of sonims may be nearly tripled without much increase in the concentration therein of Fe_2O_3. The concentration of Mn_3O_4 largely increases, P_2O_5 disappears, and the SiO_2 decreases in concentration. The total SiO_2 per unit weight of iron remains nearly constant, in the lecturer's judgment, best be interpreted as a slight decrease in the total amount of that element. Note that this is true despite the formation of additional SiO_2 in the rim. Therefore, apparently SiO_2 in the body of the casting may disappear. Attempts to identify the particular chemical compounds existing in the sonims proved fruitless since X-ray spectra did not agree with any known compounds containing the elements in question.

"Bull's-eye" Malleable

There is a great increase in interest in our country in the so-called "pearlitic" malleable. The name is a misnomer, adopted despite the lecturer's personal protest. These irons contain combined carbon but not necessarily as pearlite. There are three quite distinct types of metallography desired for differing purposes. The first consists of temper carbon surrounded, as the petals surround the heart of a daisy, by ferrite crystals, all embedded in a matrix of lamellar pearlite. The second consists of temper carbon embedded in a matrix of ferrite throughout which spheroids of cementite are uniformly scattered. The matrix structure is that sometimes designated as "spheroidite." The third structure is that of malleable iron, with a network of finely divided carbides located on the ferrite grain boundaries. The interest at this point is in the attainment of the desired distribution of constituents.

"Bulls-Eye" Malleable

The first structure, the so-called "bull's-eye" malleable, is formed in the interval between the stable and metastable A_1 point by the direct conversion of

Metallurgy of Blackheart Malleable

austenite into ferrite and temper carbon. The cooling rate must be such that the reaction is complete in the required degree. The structure can be obtained in normal malleable iron with somewhat accelerated cooling, but the result is more controllable in the presence of retarding elements, especially manganese. During the graphitising process, in this temperature range, ferrite and graphite appear simultaneously. Crysallisation is initiated at an existing graphite surface and the ferrite takes an adjacent position and makes the petals of the "bull's-eye" flower.

If ordinary malleable iron be re-heated to a temperature of say 850 deg. C. for a moderate time, equilibrium appears to be reached with the formation of a saturated solution of carbon in gamma iron. The lecturer happens to think that this solution may not be identical with austenite of the same carbon concentration. If the metal is then cooled at the rate which would be supposed to give "bull's-eye" structures, failure is almost certain to occur. A random pattern of ferrite and pearlite results. If, however, the heating at 850 deg. C. is greatly prolonged, "bull's eyes" occur at a suitable cooling rate. The explanation appears to be that, whereas white cast iron contains no ferrite when cooling through the critical range begins, a reheated malleable still contains vestiges of ferrite which initiate graphitisation by serving as nuclei for the deposition of alpha iron during the cooling process, giving the resulting iron their own random distribution. If one wishes the spheroidised matrix, it is quite important to avoid much separation of ferrite during cooling so as to arrive below A_1 in the metastable condition, with a finely laminated, or even martensitic structure. A further spheroidising treatment analogous to that for tool steels is then applied. It may be necessary, if graphitisation during spheroidisation is to be avoided, to consider a retardation of the former by suitable alloying.

These considerations lead to some comment as to the conditions under which the ferrite first appears by decomposition of martensite. A white cast iron was quenched after attainment of stable equilibrium at 975 deg. C. and then held at various temperatures (below A_1 metastable, 770 deg. C.) for three hours. At 740 deg. C. faint traces of grain boundary ferrite were seen, which became more pronounced in material held at 733 deg. C. At 728 deg. C. there was formation of both grain boundary and "bull's-eye" ferrite. At 725 deg. C. the formation of "bull's-eye" ferrite predominates and at 750 deg. C. graphitisation is sufficiently complete in 8 hours, so that only patches of what is probably speroidised pearlite remain, giving no clue to any ferrite pattern.

Mechanisation of Transformations

Instead of being completely ferritic on being held at any lower temperature, the metal begins to show a general random distribution of large areas of spheroidite when held at 682 deg. C. This is obviously a manifestation of the retardation of graphitisation by the low temperature which still permitted spheroidisation to proceed.

The temperatures here given do not check well with the A_1 critical range. It is possible that this is due to difference in thermal lag. The manufacture of the pearlitic malleable containing networks of, shall we say, fine pearlite, is an application of a very interesting phenomenon observed many years before a practical application was made. When an annealed blackheart malleable is heated to the region of A_1 transformation, carbon first dissolves along ferrite grain boundaries. Within a rather narrow temperature range, at each specific temperature, re-combination occurs only along a band of definite width. This width is apparently not a function of time after the first brief interval. Plainly the alpha-gamma transformation on heating occurs at a lower temperature for the grain boundary metal than for the body of the ferrite crystal.

One explanation which has been offered is that carbon is more easily taken into the disordered ferrite lattice near the grain boundary than into the regular lattice further in. A hypothesis based on rejections of alloy to ferrite grains would be attractive but is inadequate, for the diffuston of alloying elements other than carbon is an extraordinarily slow process and can scarcely be expected to occur at temperatures where ferrite grains form *ab initio*.

Segregation Phenomena

That the dendritic segregation of such elements as Si, Mn and P is not overcome by the annealing heat treatment is shown by the fact that cautious etching in alkaline picrate solutions of high boiling point reproduces, in a malleable iron, the original "as cast" structure. A study of structures, so developed, indicates that to a considerable extent ferrite grain boundaries run, when possible, through areas that contained cementite in the hard iron. Further, the re-combination of carbon seems easiest, that is, gamma transformation occurs, at the lowest temperatures at boundaries so located. It is known that during freezing cementite is enriched in silicon and manganese. The former raises the critical point; the latter lowers it. Apparently, therefore, the segregation of manganese is the dominating factor. Our knowledge is, however, again incomplete, for the width of the recarburised bands at the grain boundaries seems less than that of the cementite masses, which again brings us back to atomic disorder.

Near the beginning of the discussion of pearlitic malleable, the lecturer risked some criticism by hazarding the opinion that the stable and metastable solid solutions of carbon in iron differ otherwise than in concentrations. The evidence may not be completely convincing. The most important point is that during the process of graphitisation the electrical resistance of the material falls, reaching minimum at the point where cementite disappears, and then again rises.

The experiments were made under conditions which did not involve the possible reduction in size of the specimens by oxidation. Also, attempts have been made to photograph the gamma iron X-ray spectra of the stable and metastable solid solutions at high

temperatures. The inter-atomic distance of gamma iron, in which carbon is in stable equilibrium, is practically identical with that of pure iron.

The corresponding inter-atomic distance in metastable equilibrium is greater than that of pure iron, corresponding to that of austenite of a given carbon concentration. This investigation was not carried on in the lecturer's laboratory nor was it under his supervision, but was executed at one of America's leading technical schools. The investigator, a faculty member of that school, was convinced of the accuracy of his observations and, so far as the lecturer can judge, his results are entitled to respect.

Intergranular Brittleness

The last item requiring attention is the subject of intergranular brittleness. It was long known that much blackheart malleable, when galvanised, became brittle and broke with a white fracture. Explanations were sought in a possible re-combination of carbon due to overheating in galvanising or in hydrogen embrittlement due to pickling. Neither explanation could be justified. It was finally recognised that embrittlement occurred because of a fairly long sojourn of the material near 475 deg. C. and could be prevented by previous quenching from about 650 deg. C. or cured by very long soaking near 200 deg. C. It was also found that the presence of certain minimum concentrations of silicon and/or phosphorus were necessary to produce the phenomena. Note here an analogy to low-temperature impact strength which can be improved by a quench from 650 deg. C., but only if the same two elements are not present in too large an amount.

The current suggestion is that the embrittlement is due to the separation of a grain-boundary constituent. A carbide and a nitride have been suggested. The explanation seems weak. No such compounds can be seen. It is not easy to imagine a cure by low-temperature heating, and the demonstrable effect of silicon and phosphorus does not enter into the explanation. This is one of the unsolved problems, even though, from an operating viewpoint, our knowledge suffices. A similar instance where satisfactory operating knowledge exists without proper scientific basis is that the graphitising rate of white cast iron decreases with the basicity of the refractory in which it is melted.

Conclusion

In preparing the present Address, it has seemed wise to adopt a rather strict limitation of metallurgical principles. Obviously the subject could be much expanded in the direction of equilibria in melting furnaces, heat transfer problems and many other engineering fields. These fields are, however, seldom limited to the malleable industry alone and an extension of our interest along these lines would produce a Paper dealing not with its present subject but with foundry engineering in general.

In conclusion, I can only express to you, to your officers and to your council, my sincere thanks for the opportunity of preparing the present Lecture and my appreciation of the honour therein involved.

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How Foundry Personalities Appear to the Caricaturist

Reading left to right:—(Top Row)—Mr. G. R. Strauss, Minister of Supply; Mr. R. B. Templeton (President of the Institute); Mr. F. Arnold Wilson (Hon. Sec., London Branch). (Middle Row)—The Rt. Hon. Lord Llewellin; Mr. J. W. Gardom (Past-President); Mr. N. Newman (Vice-President). (Bottom Row)—Mr. FitzHerbert Wright (President, Joint Iron Council); Mr. J. G. Pearce (Director, B.C.I.R.A.). and Dr. J. E. Hurst (Past-President).

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U.S. Patent 1,636,657, H. A. Schwartz, "Making Malleable Iron Castings," July 19, 1927.

U.S. Patent 1,640,674, H. A. Schwartz, "Making Malleable Iron Castings," August 30, 1927.

U.S. Patent 1,660,398, H. A. Schwartz, "Manufacture of Malleable Cast Iron," February 28, 1928.

U.S. Patent 1,984,474, R. C. Good, "Malleable Iron Casting," December 18, 1934.

U.S. Patent 2,058,039, H. A. Schwartz, "Hardened Malleable Iron," October 20, 1936.

U.S. Patent 2,253,502, A. L. Boegehold, "Malleable Iron," August 26, 1941.

U.S. Patent 2,370,225, A. L. Boegehold, "Malleable Iron," February 27, 1945.

THE SECRETARYSHIP OF THE CAST IRON CHAIR ASSOCIATION has been changed to the following:—Peat, Marwick, Mitchell & Company, Secretaries, The Cast Iron Chair Association, Queen's Square, Middlesbrough, Yorkshire.

REFERRING TO THE CASE of trespass by school children in a foundry, reported on page 550 of our last issue, it is now disclosed that the intruders were identified because the foundry foreman, in the rôle of Sherlock Holmes, poured molten metal into their footprints and presented the castings to the police.

Publication Received

Staveley Story. Edited by Gordon West, and published by the Staveley Coal & Iron Company, Limited, Hollingwood, Chesterfield.

This is the most brilliant piece of publicity ever issued by the metallurgical, let alone the foundry, industry. Colour printing is seen at its best; historical processes are contrasted with the ultra modern, through the work done by the Staveley concern. Writers of unquestioned eminence—Anthony Armstrong, Sir John Hammerton, Charles Graves, John Langdon-Davies, and a dozen others—have given of their best. The really fine illustrations in colour have been done by D. L. Ghilchik, the "Punch" cartoonist. As a piece of publicity this publication is unique. No one can be disinterested, and the layman (and who is not a layman *vis-à-vis* with the multifarious activities of Staveley?) will quite subconsciously absorb much information difficult to find elsewhere. Moreover it leaves an indelible impression in one's mind of the complexity of modern business and generates an admiration for the enterprise, initiative and foresight of such individualists as the late "Charley" Markham and Harold Berresford. The reviewer deems the following to be a basic statement which merits the attention of the left wing of the Government. Sir John Hammerton is writing of the late Mr. C. P. Markham:—"A commanding figure of a man: no wonder he could usually get his own way in the numerous negotiations he had to conduct; no wonder also that he occasionally started up some measure of opposition when he came in conflict with the miners' leaders, as on one occasion it was suggested that the miner was entitled to a share of the profits accrued from the scientific uses to which the by-products of coal were put by the industrial chemists and metallurgists who built-up and are still expanding the marvellously varied products of Devonshire works. It was like suggesting that the quarrymen who dig the stone, which the sculptor chisels into a noble statue, should have a royalty on the art of the sculptor!" The reviewer's sole adverse criticism is that there should have been printed somewhere or other the full title and address of the "Staveley" concern.

Student Exchange

Mr. T. Chenesseau, of the Etabts. Chenesseau et Cie., Fonderies d'Orleans, 33, Faubourg Bourgogne, Orleans, would like to hear from a British foundry executive, who would accept young Mr. Georges Chenesseau during the month of August as a foundry trainee and send his own son to Orleans on an exchange basis. The Orleans foundry makes iron castings both by machine and hand. On returning to France, Georges, who has been working in the shops, is to go to the Paris Foundry High School. The Editor would like to hear from any reader who is interested.

We regret to announce the death, at the age of 58, of Mr. E. W. Robertson, who, for the past 28 years, was on the staff of the advertising department of the FOUNDRY TRADE JOURNAL.

The Institute of British Foundrymen

Forty-fifth Annual Conference in London

Annual General Meeting

The first function at the Annual Conference of the Institute of British Foundrymen, held in the Café Royal, Regent Street, W.1, was the Annual General Meeting, on the morning of June 9. The Retiring President, Mr. P. H. Wilson, O.B.E., M.I.Mech.E., presided. In the first place Mr. Wilson extended a warm welcome to a number of visitors from overseas, and to the large number of members of the Institute who attended.

On the motion of Mr. V. Delport, seconded by Mr. J. Bell, the minutes of the Annual General Meeting, held at Nottingham on June 18, 1947, were taken as read, and were confirmed and signed.

Annual Report

The RETIRING PRESIDENT, presenting the Annual Report of the Council for the session 1947/48, said that during the last few months the list of members had been carefully revised and a number of names had been removed from the roll, being in arrears with subscriptions. On the other hand, quite a large number had been elected to membership during the year. The result was a net increase of 215, making a total membership of 4,117 on April 30 last, which was a record.

He also drew attention to the paragraph in the report dealing with the Institute's application for a Supplementary Charter. Since the Report was written the Institute had been informed that H.M. the King had approved the Supplementary Charter. It was hoped the Institute would now have authority to operate the new bye-laws which the members had sanctioned a year ago. Those bye-laws would bring about certain changes with regard to administration, and particularly with regard to membership; the staff of the Institute were working out the effects of those changes on the general procedure of the Institute and of its Branches. The members would be informed in due course.

He proposed the adoption of the Annual Report.

MR. S. H. RUSSELL (Past-President), seconding, said how gratified some of the older members were by the progress which the Institute still maintained; he congratulated the Officers and Committee on their excellent work, and said that the Institute, so far as he could judge, was one of the most lively in the country.

The Report was adopted.

MR. D. HOWARD WOOD (Past-President) moved a resolution confirming the action of the Sub-Committee which had agreed to the alteration of the bye-laws; they were alterations to the wording of the bye-laws, to comply with Privy Council requirements, and did not affect the principles of the revised bye-laws as approved by the members of the Institute a year ago. The Institute's legal advisers had recommended that a resolution be put to the Annual General Meeting confirming the modifications which related mainly to subscribing firms and the qualifications of representatives of subscribing firms.

MR. F. ARNOLD WILSON seconded.

The resolution was carried.

Finance

MR. C. W. BIGG (Hon. Treasurer and Past-President) presented the Accounts for the year ended December 31, 1947, and the Balance Sheet as at that date, and proposed their adoption. He could paint, he said, a glowing picture with regard to the Institute's increased income, and he would not be altogether despondent in comparing the expenditure with the income; the increased expenditure was quite commensurate with the increased income. The surplus of income over expenditure, which was £254 on a total income of over £9,000, was not such as to give a rapacious Treasurer cause to gloat; it meant that the Institute could not do just what it liked financially.

MR. COLIN GRESTY seconded.

The Accounts and Balance Sheet were adopted.

Technical Report

MR. A. E. PEACE (Chairman of the Institute's Technical Council) moved the adoption of the report of that Council. He expressed satisfaction in the translation of the work of Sub-Committee T.S. 16 into the new British Standard Specification for Grey Iron Casting. He also drew attention to the extension of co-operation with other technical organisations, among whom he mentioned the Institute of Metals and the British Steel Founders' Association. Again, he mentioned the increasing use which was being made of external research facilities, and said that during the past year the Technical Council had sought the help of the National Physical Laboratory, the Aeronautical Inspection Directorate, and Birmingham University.

Present conditions affecting the industry had influenced the nature of some of the work. The endeavour had been made to serve the needs of the moment, whilst at the same time continuing the long-term research and the application of the results in the foundry; it was the present policy of the Technical Council to aim high and continually to improve foundry processes.

MR. L. W. BOLTON (Vice-Chairman of the Technical Council), seconding, said that at present there was a larger volume of work in the hands of the Sub-Committee than had been the case for some considerable time, and a very gratifying feature was the number of members who were serving for the first time on those

Annual Conference in London

Sub-Committees; that introduction of new blood augured very well for the future.

The volume of work had thrown a considerable added burden on the clerical staff at Head Office, but they were willing and able to cope with it. He paid tribute to Mr. G. Lambert, Assistant Secretary to the Institute, for the able manner in which he had served as Secretary of Sub-Committees.

The Report was adopted.

Presentation of Awards

The RETIRING PRESIDENT presented the following awards:—

Oliver Stubbs Medal, 1948:

To Mr. L. W. Bolton, who had been a very active member of the Institute for some 20 years. The medal was awarded to him in recognition of the very valuable work he had done for the Institute in that time.

MR. BOLTON, who expressed his pride in the award, said that any work he had been able to do had given him real pleasure, and he hoped he would be able to continue it in the future. Perhaps the Council had had in mind the work which had recently been completed by Sub-Committee T.S. 22, of which Sub-Committee he was honoured to be Chairman. He paid tribute to the members of that Sub-Commitee for the support and assistance they had given him.

E. J. Fox Medal, 1948

This Medal and the parchment accompanying it was presented by Mr. Fox to Mr. J. G. Pearce. Mr. Fox offered his warm congratulations.

MR. J. G. PEARCE (Director, British Cast Iron Research Association), expressing his very great pride and pleasure in receiving the award, said he regarded it as a tribute to the work of the Research Association and its staff, for they all worked as a team; although members of the staff were called upon from time to time to take responsibility for a particular piece of work or to present a particular paper, the whole of the staff in their respective and several capacities had a share in the final result; there was a good deal of the iceberg beneath the peak which lifted its head above the surface!

Having had the great pleasure during the previous month of attending the conference of the American Foundrymen's Association at Philadelphia, and which was associated with an exhibition of foundry materials, he said the number of registrations numbered well into five figures. A very great impression was produced upon that conference by the two Papers which were presented under the auspices of the Institute of British Foundrymen. One of them was by Mr. E. Longden, covering work which could not be done outside a very large foundry, and one by Mr. H. Morrogh, on the production of the nodular cast iron, the second instalment of the story of which was to be given in a Paper at the London conference of the I.B.F. that afternoon.

They looked forward to the establishment within a very short time of a new basis of membership and support of the British Cast Iron Research Association, a basis which would make every iron foundry in the country a member of that Association. If it worked out as anticipated, the Association would be free from certain restrictions which had made it necessary to confine the results of at any rate some of its work to subscribing members. Therefore, he looked forward confidently to a considerable expansion of the co-operation which had always existed with the Institute, and anticipated that the relation between the two bodies would become even closer in the future than it had been in the past.

Meritorious Services Medal

The presentation of this Medal was made by the Retiring President to Mr. C. Lashly, M.C., who had served as Hon. Secretary of the Newcastle Branch for 14 or 15 years; the very active and healthy condition of that branch was attributed very largely to the work of Mr. Lashly.

In his response, Mr. Lashly expressed his grateful thanks for the help he had had from the Presidents and the members of the Council of the Newcastle Branch, for the tolerance of the members of the Branch, for the help afforded him at all times by Mr. Tom Makemson, the General Secretary of the Institute, as well as for the kindness of his firm, Sir W. G. Armstrong Whitworth & Company, and its Managing Director, Mr. W. Scott. Finally, in the foundry, it was a great satisfaction to work in association with men who were really men and who were serving a very fine industry.

British Foundry Medal

This Medal was awarded to Mr. R. C. Shepherd for his Paper on: "The Influence of Production Flow on Moulding-Methods in Iron Foundries, and its Effect on Production per Man-Hour and General Efficiency." It was presented to Mr. Shepherd by Mr. Barrington Hooper, C.B.E., the donor.

Mr. Shepherd expressed his appreciation of the great honour bestowed on him, which would always be a source of inspiration, and his thanks to the Institute and Mr. Barrington Hooper for having presented it to him.

(In former years the British Foundry Medal was awarded to Mr. J. W. Gardom (Past President), Mr. J. Vickers, Mr. S. L. Fry and Mr. Basil Gray. Owing to conditions of austerity, the actual Medals were not available until this year. Mr. Barrington Hooper formally presented them to Mr. Gardom and Mr. Vickers; Mr. Fry and Mr. Gray were unable to attend the meeting.)

Diplomas for 1948

The award by the Council of three Diplomas for 1948 was announced, as follows:—

To Mr. R. F. Coates, for a Paper on "Foundry Conditions, Personnel and Production," to the London Branch.

To Mr. G. L. Harbach, for a Paper on "The Development of Foundry Sand Control," to the Wales and Monmouth Branch.

To Mr. D. Robertson, for a Paper on "Loam Moulding of Rope-Barrel Castings."

Election of Officers, 1948-49

President

The RETIRING PRESIDENT proposed the election of Mr. R. B. Templeton (Senior Vice-President) as President for the ensuing year. Quite a lot had been published recently, he said, of Mr. Templeton's activities in connection with the Institute. He was elected a member in 1930 and had been a most active member, particularly in recent years. He was a successful and popular President of the London Branch, and as Junior and Senior Vice-President of the Institute he had become known to a very much wider circle. The members had looked forward to seeing him in the Presidential Chair.

MR. E. M. CURRIE (Past President of the London Branch), who seconded, recalled the close association he had had with Mr. Templeton during the past 15 years, and said that a man who could build up a small local business into one which was respected throughout Britain and also on the Continent was just the type of man who possessed the organisational skill, perseverance and imagination that was needed in a President of the Institute. The future progress and achievements of the Institute could confidently be entrusted to his guidance.

(Mr. Templeton was unanimously elected and, amid applause, the Retiring President invested him with his chain of office.)

MR. TEMPLETON invited Mr. Wilson to continue to preside for the remainder of the Annual General Meeting, and expressed his great appreciation of the honour bestowed upon him, and said he had no need to be assured that the Past Presidents, Honorary Officers, Members of Council and the membership of the Institute as a whole would give him just that kind consideration, fellowship and sympathetic help which would make his year of office very happy and enjoyable. He would do his best to merit the confidence and trust placed in him.

(He then presented to Mr. Wilson his Past-President's Medal.)

Senior Vice-President

MR. V. C. FAULKNER (Past-President) proposed the election of Mr. N. P. Newman (Junior Vice-President) to the Office of Senior Vice-President, and said it was appropriate that he should do so, for he was responsible for getting Mr. Newman to join the Institute and had induced him to present his first Paper. When Mr. Newman had joined the Institute his foundry was an isolated one, but today it was catered for by the Bristol and West of England Branch, of which he was a leading member. He represented a second generation of foundrymen, and it was regretted that his father was not present at the meeting to see him elevated to the important position of Senior Vice-President.

MR. J. W. GARDOM (Past-President) was privileged to second, and commented on the Institute's very wise choice.

(Mr. Newman was elected, and was invested with his badge of office by the Retiring President, who congratulated him and remarked upon his great enthusiasm in the work of the Institute.)

Mr. N. P. Newman expressed his great appreciation of the honour conferred on him.

Junior Vice-President

MR. D. HOWARD WOOD (Past-President), proposing the election of Mr. John Sheehan as Junior Vice-President, recalled having met him 19 years ago during a visit, with members of the Institute, to the Ford Motor Company's works at Cork, where he was then Chief Chemist and Metallurgist.

It was a privilege to submit his name for election. He had graduated in applied chemistry and physics at the National University of Ireland, and had afterwards obtained an Associateship of the Royal College of Science. He had had a very wide experience in America, Mexico, Ireland and this country. He had served as Foundry Metallurgist at the Ford Company's works at Dagenham, and subsequently became Foundry Superintendent at the Austin Motor Works; and for the past four years he had been Managing Director of the Coneygre Foundry Company, Tipton. He had a wide knowledge of all aspects of foundry practice, and could be regarded as one of the leading experts in this country on foundry sands. Such were his technical qualifications.

As to his personality, one felt that Shakespeare must have anticipated Mr. Sheehan's arrival on this earth when he had written:—

> "He is a scholar, and a ripe and good one; exceeding wise, fair-spoken and persuading, he reads much, he is a great observer, and he looks quite through the deeds of men."

Mr. Sheehan was a perpetual surprise even to those who knew him best; and it was said that "best men are moulded out of faults." Having a strong spice of Irish wit, he was annointed above his fellows with the oil of good feeling, and he passed all things through the alembic of his own mind. A man of rare personal qualifications, he was well qualified for the tasks which would eventually be assigned to him as President.

MR. JOHN CAMERON (Past-President), seconding, recalled having met Mr. Sheehan for the first time only two years ago, and said that on that occasion he had made a new friend. From men such as the late Mr. R. Buchanan (the Institute's first President) and the recently departed Mr. F. J. Cook, Mr. Sheehan would inherit in two years hence a very fine position, and one could be sure that he would carry out his duties with dignity and efficiency.

MR. SHEEHAN, having been elected, expressed his appreciation of the honour. He commented that the occasion on which Mr. Wood, Mr. Gardom and other members of the Institute had visited Cork was the first on which he had met technical men who had proved human; it was a delightful surprise to meet men who could talk of the carbon diagram and of the phase rule, and who could stay human! The foundry did make men; he was reminded of the double-ended grinder in the fettling shop, which ground down, but could polish up! It ground away flash, and it ground down a swell; but the foundry shaped a man just as a sand mould shaped a casting. The technical end of the foundry industry and the technical men in it

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would have his sympathy and consideration during his period of office.

The following further officers were appointed as follows:—

Auditors

Messrs. J. & A. W. Sully & Company (Chartered Accountants) were re-elected Auditors for the year 1948/49.

Members of Council

The results of the ballot for the election of five Members of Council, who would serve for two years, was announced as follows:—Dr. A. B. Everest; Mr. Colin Gresty; Mr. Barrington Hooper, C.B.E.; Mr. A. E. Peace, and Mr. R. C. Shepherd.

Past-Presidents' badges awarded to the following were presented:—Mr. R. Miles; Mr. D. Sharpe; Mr. J. W. Gardom, and Mr. D. Howard Wood. (The badges for Mr. Miles and Mr. Sharpe, who were unable to attend, were received on their behalf by Mr. Mercer and Mr. Paterson respectively.)

Thanks to Retiring President

The PRESIDENT, proposing a very hearty vote of thanks to Mr. P. H. Wilson for his services as President during the past year, said he had brought to the Institute a vast experience, not only of the industry, but of many of the technical bodies associated with it, as, for instance, the British Cast Iron Research Association, and that experience had been of tremendous value, particularly on the technical side. In past years he had read many papers, and he was an E. J. Fox Medallist; he must be aware, at the end of his period of office as President, that he had done much to enhance the prestige of the Institute.

MR. N. P. NEWMAN (Senior Vice-President), seconding, said that as a young man he had not only a deep respect for Mr. Wilson in the technical field, but also a real affection for him as a father of the Institute. He had had the privilege of serving under Mr. Wilson in the Institute and outside it; Mr. Wilson was Chairman of the Midland Region Steering Committee of the Joint Iron Council, and had been very kind to Mr. Newman during the past year particularly.

(The vote of thanks was carried with acclamation.)

MR. WILSON, in his response, said he had been particularly impressed by the enthusiasm of the Branches in the work they were doing, and he was appreciative of the warm welcome he had received from the members of the Branches he had visited during his term of office.

On the question of giving every encouragement to the younger generation in the foundry industry, he said he had arranged to deposit with the Institute a sum of money to provide prizes each year for youths in the industry; the details would be decided by the Committee and would be made known to the Branches. (Applause.)

Mr. Wilson concluded by expressing his thanks to the Past Presidents, the Executive Committee, the Council and all who had assisted him during his year of office, which had proved to be a source of great pleasure to him.

Greetings

A telegram of greetings was sent from the conference to the American Foundrymen's Association.

A telegram was received from the President of the French Foundry Technical Association, Dr. Ballet, conveying cordial wishes for the success of the conference, and his personal regret that he could not take part.

(The Retiring President said that among the visitors from overseas who were very welcome at the conference was Mr. Stupfler, of the French Association.)

(The business of the Annual General Meeting was concluded.)

Presidential Address

Mr. TEMPLETON occupied the Chair at the subsequent proceedings and delivered his Presidential Address. [This was printed in our last issue.]

The thanks of the Institute were proposed by Mr. P. H. WILSON (Immediate Past-President) to Mr. Templeton for his interesting review of the progress of the industry over the last few years. It was pleasing, he said, to hear the tribute which was paid to the Branches of the Institute; and it was profitable to be reminded of the obligations and responsibilities of all who were engaged in the industry.

Mr. N. P. NEWMAN (Senior Vice-President), who seconded, said the President's Address had shown evidence of deep thinking on a very intangible subject. Commenting on the reference to incentives, he said the most important incentive of all was the incentive of their own souls, to give of their best to the work in which they were engaged. If they could engender throughout the industry, as well as in the Institute, the will to give of their best there need be little fear for the future.

(The vote of thanks was carried with acclamation, and the President briefly responded.)

The Edward Williams Lecture

The Edward Williams Lecture this year was contributed by Dr. H. Schwartz, of Cleveland, Ohio, under the title "Some Solved and Unsolved Problems in the Metallurgy of Black Heart Malleable."

Dr. Schwartz had hoped to deliver the lecture personally, but unfortunately was unable to make the journey to this country. A telegram was received from him, as follows:—

> "With you in spirit and sorry not to be in person. Best wishes.—Schwartz."

The lecture, which is printed elsewhere in this issue, was presented on his behalf by Mr. A. E. Peace.

The PRESIDENT congratulated Mr. Peace on the masterly manner in which he had presented a highly technical lecture.

Mr. NEWMAN expressed the warm thanks of the Institute to Dr. Schwartz for his lecture and to Mr. Peace for his admirable presentation of it. He added appreciation also of the telegram which Dr. Schwartz had sent to the Conference.

Mr. SHEEHAN (Junior Vice-President), seconding the resolution of thanks, said he looked forward to the

(*Concluded on page* 598 *at foot of column* 2)

The Institute of British Foundrymen

Annual Banquet

LONDON JUNE, 1948

The premier social function of the year brought a record attendance

The Annual Banquet of the Institute of British Foundrymen was held on June 8, at the Café Royal, Regent Street, London, W.1. The President, Mr. R. B. Templeton, in the chair.

Following the loyal toasts, that of "The Institute of British Foundrymen" was proposed by the Minister of Supply, Mr. G. R. Strauss, M.P., who said it gave him enormous pleasure to meet them all, because in the course of his duties as Minister of Supply he had read volumes of reports and masses of statistics about their industry, about their achievements—he was going to say about their faults, but he did not think they had any—about their activities, progress and the rest of it, and he had been yearning for a long time to meet the people who were responsible for running that most important industry. In the first place he would like to tell them how very sincerely gratified he and his Ministry were at these great achievements of the industry. He wanted to tell them, moreover, that they considered the activities of the foundry industry of vital importance in our national struggle for recovery.

Their industry was not only an exceedingly important one, it was a very old one indeed, having started, he had been told, in China in the pre-Christian era when many marvellous statues were cast on the roadside, not in foundries or works. Many of those statues were to-day world famous. There was no doubt that the standard of skill and technique in those days was extraordinarily high. But since those days we had made progress in this country and now we could look with admiration on the vast foundry industry, consisting of over 2,000 units, to-day employing over 140,000 people, more than ever before in its history.

The Civil Service

He was particularly happy that the relationship between their industry and his department was so good. There was a great deal of talk, a great deal of mutual help and advice given by his department to individual members of their industry. It was a very good thing indeed to find that excellent co-operation existing between an important industry such as theirs and a Government Department. He had been told that when their members were in difficulties and trouble—and even their members sometimes got in difficulties—when they wanted additional raw material, or timber, or a telephone installed, or a little drop of petrol for their cars—(laughter)—they were given careful consideration. He would not say that on every occasion they were able to satisfy all their demands, probably they would be wrong if they did, but he sometimes said to the officials in his department that they should change the name from Ministry of Supply to Universal Aunts.

One particularly satisfactory thing was that their industry and those who worked in his department as civil servants got on so well together. Frankly he sometimes got a little bit annoyed when he heard general charges made about the British Civil Servants being careless and lazy and indifferent to the public interest. Usually at the same time he heard that general charge made he found the people making it added, "but we get on excellently with Mr. So and So, or Mr. Someone Else" in some ministry with which they were in constant and frequent contact. Their condemnation was exceedingly demoralising and wholly unjustified in his view, for our civil servants were magnificent servants of the public and extraordinarily capable. At the same time he did find appreciation of the individual work that they did.

Before coming there that evening he had asked his department to tell him in detail what their industry had been doing and were expected to do during the coming year in order to meet the essential requirements of our industries. He found there was, indeed, a formidable list, and he quoted two or three figures indicative of the achievements expected.

Future Production

To start with they expected, during 1948, castings to the extent of three million tons of iron, and in order to fulfil our general national programme of 14½ million tons of steel this year we would require a quarter of a million tons of ingot moulds and furnace castings; half a million tons of pipes had to be made this year for housing, water and gas supplies; nearly half a million tons of castings were needed for the motor industry and 140,000 tons for the textile and mining industry.

He knew that in all the work done by their industry they received a tremendous amount of aid from the Institute, which was founded over forty years ago, was carrying on its activities and expanding to its present size of over 4,000 members, and was an institute whose Charter had recently been amended and had received the King's approval. They were doing a tremendous amount of first class work. He had been particularly interested in the work they were doing in providing educational facilities and the technical advances of the industry. He had been told in that connection that there had been enormous technical advances during the last fifteen years or so and that, for example, whereas in 1930 the highest tensile strength of their products was something like 20 tons per square inch, to-day that figure had been raised to 50 tons.

Tributes to the Institute

While speaking of the Institute he would like to mention one or two names of men who had not only

Annual Banquet

contributed to the strength of the Institute and its advancement, but also to the industry of this country generally. First there was their secretary, Mr. Makemson, who for a long time had been the driving force in its development. He had been their secretary for a long time indeed, had taken many public responsibilities, including that of Director of Iron Castings, was awarded the M.B.E., and still acted as Staff Advisor for the Iron and Steel Board.

He also mentioned and paid full tribute to the present President of the Institute, Mr. Percy Wilson, who relinquished his position very shortly, particularly for the help he afforded the nation in many ways during the war, and for running a foundry in a way which had never been done before—with a very high percentage of women labour. He understood that no one else could have done it, for he had a way with women which no one else possessed.

Finally, he wished to express his appreciation for the work done and to be done by Mr. Templeton, their new president.

There were one or two other matters to which he would like to refer before he completed his time limit. During recent months he had had the opportunity of vsiting a large number of foundries, many of them exceedingly good, and he was delighted to find that everywhere to-day there was an awareness of the necessity of improving conditions of work in foundries. In some of the industries he had seen, conditions had not been too good, and it seemed that there was still a small section of the country where the people were reluctant to bring about the best modern conditions.

Overcoming Difficulties

We were, as they knew, in very grave difficulties to-day and were going to be given a chance to get out of them by E.R.P. aid which had been afforded us. That did not mean it would get us out of our difficulties, it would merely give us a chance to get out. Whether we succeeded or not would depend on the conscious co-operation of everyone in the country, the ordinary workers, the Government and everyone, striving towards the one National purpose of increasing production. There was every indication that in that co-operation we were getting results. We were increasing production everywhere. The spirit of the country was as great and determined to-day as it was at any time during the war. Their industry had an important part to play. They were playing that part remarkably well. They were doing everything that was being asked of them and producing as many goods as they were asking and, at the moment, rather more.

He was perfectly certain that they in the Government could look forward with confidence to continued co-operation, and he could assure them they in the Government would do all that they could to help them in every way. They recognised their importance fully. They recognised what a grand job of work they were doing. They wished them every success and prosperity. In all their activities they would use all their resources which as a Government they had at their disposal, to help them secure their objects.

The President's Response

The President, Mr. Templeton, who responded to the toast, said before replying there was a telegram he had to read. It was: "Foundrymen of America extend cordial greetings and best wishes for successful 45th Annual General Meeting of British Institute of Foundrymen—President of the American Foundrymen's Association."

Rising to respond to the toast which the Minister had proposed in such well informed words, he was rather overawed by the greatness of the occasion. Forty-five years ago the Institute was founded, and on the present occasion they had the largest company in their history. It was seemly and fitting that Mr. Strauss, as a member of the Government, should have attended and been able to announce that His Majesty had approved of a charter for the Institute, a charter which was similar to the one King George V signed for them 25 years ago. By it their stature and standing were enlarged and raised, and they as members were happy to give thanks for that gracious act.

Human Relationships

He had been impressed by the Minister's words in a recent speech at Birmingham when he dealt with human relations which existed, or should exist, between management and men in industry. There, he thought, he had touched on a great movement which was afoot to-day to bring about a better understanding and a better co-operation and good will which was so vital to our survival these days. Year after year we saw the evolution of ideas and practices which aimed at reducing the physical effort needed of the man in doing his job of work, and very soon our thoughts might be mechanised. But there was one thing no one could ever do, and that was they could not mechanise good will. Good will and co-operation had to be persuaded and charmed out of people. To get the real value out of mechanisation—if they could attain that ideal of co-operation and understanding, then there was a veritable Niagara of energy which, if it could be tapped, would soon pull this country up and put it on its feet again and make it more happy and prosperous than it had even been in its history.

He wondered sometimes if there was not a latent fear that over production might land us into unemployment and poverty instead of prosperity. History proved that such fears were thoroughly groundless.

In 1914 when he went as a new recruit into the Army, their platoon sergeant in his first lecture to them said: "Now, you recruits have no doubt been told that a boy's best friend is his Mother. But you are in the Army now and your only friend is the rifle." Couldn't they bring that idea into industry to-day? The boy recruit and his rifle—the man and his machine!

He thought the British working man was really a grand fellow. There was no question about that. He was no Communist or totalitarian. He was virile and a rugged individualist. If we took a cross section of the whole of the thought of the people to-day we should find the same desire which animated them

animated him—the simple desire to give a better education and way of life and greater security to his children. That was the stuff of which lasting nations were made and raised.

If they examined industry to-day they would find a very large percentage was made up of small firms. What a great opportunity that offered for co-operation and understanding. In his own small way he had tried to foster that sort of thing in a company which he managed. He had tried to cultivate a rather free and easy discipline between man and man. At times he wondered if that discipline were not a little too free and easy. In April, just after the Budget, he was going round the foundry and stopped to have a word with one of the moulders. They did not agree with each other's politics and often had a crack at one another. He said to him: "By the way, Tom, I gave up smoking last week. He replied: "Is that it, Sir! Now I know. I have been worried about you. We were only talking about you in the canteen the other day and someone said 'What has happened to the Governor that he is going about the place looking so miserable?'"

Roosevelt Memorial

On that occasion they were delighted to have with them Sir William Reid Dick, whom they all knew. He was the designer of that beautiful work of art which was unveiled some few months ago to President Roosevelt. Somewhere in the room, also, were two or three of the craftsmen of the London Foundry who moulded and made possible that work of art. Theirs was an art, a technique in founding which had come down to us from pre-christian times, down through the great period of renaissance, and they were proud to be associated with it. It was something far removed from the great hurly burly of modern production; it was something far above work prices and time sheets, and cost accounting had no place in its relation, and they were happy to be associated with it.

Ours was a civilisation of iron and steel, brass and aluminium, of wheels and cranks and furnaces and the overall clanging of machines. It was a civilisation in which steel had overcome our views and in which cold iron had overcome and stifled nearly every human emotion. In such a civilisation as this it surely was necessary that we should have such things as music and literature, painting and sculpture, unless our lives were to become a drab and dreary and horrible emptiness which ended in a spiritual vacuum. They were grateful to Sir William for coming and being associated with them in that way.

"Give us the Raw Materials"

He did not propose to worry them with statistics, the Minister had done that and told them of their record. Statistics were an indigestible thing. He had told them what was required of them, and he could assure the Minister that they would not fail him, but he would say quite respectfully to the Government that they could not produce the goods without them, and neither could they produce the goods without the Government. The fact that the Minister had come there that night and addressed them was typical of the happy partnership which they welcomed so much. They lived very close to their industry and they were alive to the stresses under which the country was struggling to-day. He would say to the Minister "Give us the raw materials and we will give you the goods, and do our best to mould and cast this great country of ours back to prosperity."

They were very grateful to the Minister for attending and proposing the toast in the way he had.

In conclusion he would say:—Good times were with them, good times were passing; bad times might come, but good times would come again; new presidents would come and, like him, have their crowded hour of glory and afterwards their year of hard labour, and they would go. The one thought which he wished to leave with them was that the Institute, founded by the foresight of those men nearly half a century ago, improved and handed down to them was a sacred trust to them for them to see that they handed it on so that it prospered and continued.

The Visitors

Mr. N. P. Newman, the Senior Vice-President, when proposing the toast of "The Guests," said he felt rather nervous about it, for he had started the evening badly. When he got into the lift downstairs the lift man said, "This way to the British Foundry," and he feared they might have already been nationalised!

Proposing that toast it was impossible for him to name every guest for there were over 38 of them, and he was sure they would excuse him if he mentioned a few only.

First there was the Minister of Supply, their guest of honour.

A few weeks ago he had the pleasure of being Chairman at a small informal dinner in Gloucester at which the Minister was present. He had always had at the back of his mind that Ministers were cold, formal and difficult people. He quickly found that their Minister was approachable, friendly, and they became friends within the first ten minutes. On the present occasion they welcomed him as an accepted friend.

He also welcomed Lord Llewellyn, who would respond to the toast. Lord Llewellyn was a famous man. He was sure he would be embarrassed if he catalogued his many achievements, but he felt he should tell them of his very fine war record in the Government. During the war years he had held all the following posts:—Starting with Civil Lord of the Admiralty he became Parliamentary Secretary to the Ministry of Supply, Aircraft Production, War Transport, President of the Board of Trade, Minister of Aircraft Production and Minister Resident in Washington. Any man who had held all those posts had done more than his bit for his country.

The next guest he had to welcome was Sir William Reid Dick, who had already been referred to by the President. Sir William, as the President had already said, had designed the Roosevelt Memorial, and any who had had the privilege of seeing it would agree that

Annual Banquet

it would be not only a lasting monument to a great man, but a lasting monument to the designer.

Their next guest was Sir Giles Gilbert Scott, who was the architect for Waterloo Bridge and Liverpool Cathedral. Any who had had the pleasure of looking round Liverpool Cathedral would say that there was a magnificent monument to his great work for many generations to come.

The only other visitors he proposed to refer to were foreign visitors. They had nearly 30 overseas visitors at the Conference, some of whom were members and others were members of associated societies. They included a number of members of societies in Belgium, France, Sweden, Norway, Holland, and the U.S.A. and several members from India.

As the President had told them, they were very proud of their Institute. They felt it was a live institute and one which was very progressive.

Lord Llewellyn's Response

Lord Llewellyn, responding to the toast, said he felt he ought to have the aspect enjoined on his men by a sergeant who was arranging a firing party for a funeral. He told his squad, "When you get to the cemetery you should assume a cheerful and a yet a despondent aspect. Cheerful when you think where the dear departed has gone, and despondent when you remember how much he left owing to the Mess."

On that occasion he was cheerful at the honour and privilege of being with them, but rather despondent that he had to make a speech at the end. But the subject was a happy one because he knew he spoke for a very large number of guests owing to their great hospitality. They would all, he felt sure, wish to express their thanks for having been invited and given such a good time.

The craft of foundryman was a very ancient craft which had come from the old days; Mr. Strauss had quoted China, and the President had mentioned the Renaissance, and they heard of those who were workers in silver and gold and brass in the days of the building of King Solomon's Temple. Those men, however, he was told, did not do the job in quite the same way as it was done to-day—they were forgers rather than foundrymen. He was not suggesting that any of them were forgers! (Laughter.) Although from time to time they might of course make a slight mistake on one of those forms—to let them into a secret, which were devised by one of their guests, Sir John Duncanson, who came in those days under his instructions. However, theirs was a great trade and had been of great benefit to mankind, and they were and always had been very thorough in their job. In a biography of that great Italian sculptor, Benvenuto Cellini, it was reported that in order to finish one of his famous statues he told his wife—he hoped all wives present were just as amenable as she was—that he must have all her pots and pans in order to complete his great work. He was one of the worthy predecessors of Sir William Reid Dick. While mentioning his name he would like to say a few words as one who was privileged to know and often to meet Mr. Roosevelt in Washington, what a wonderful study had been produced. Not only the likeness of that great man had been produced, but also his personality.

If that great Italian sculptor did that in 1400, times had not much changed in 1940, because he remembered in the early days when they were forming the Ministry of Aircraft Production, Lord Beaverbrook, his Minister, called on all housewives of Britain to turn in their aluminium pots and pans in order that they might be used to build aircraft. It was the wish of the guests that the President and Members of the Institute and all those who formed that great association, should go on and prosper. He could himself testify that the various departments he was in—and he was glad that the proposer of the toast omitted the Ministry of Food from the departments he was in, and he really was in all those Ministries; he could assure them that all of them who were in that war-time Government, and they were men of all parties in it, very much appreciated the wonderful efforts that they put forward to meet the war effort. He hoped they would go forward and prosper, and as they went forward and prospered and completed their programme so the prosperity of this country of ours could only be enhanced.

He, on behalf of the guests, thanked the Institute for its hospitality to them.

"The Chairman"

Mr. P. D. Pincott, President of the London Branch, proposing the toast of "The Chairman," said he thought it true to say the success of any section of an organised community was dependent very largely upon its leaders, and the Institute of British Foundrymen was no exception to that rule. They had a history of which they could be justly proud. At the commencement of the 30th year of their history they elected and installed their President, that grand old product, if he might say so, of the London Branch, Mr. R. B. Templeton. Mr. R. B. Templeton deserved great credit and admiration for the work which he had done, and was still doing in that institution of theirs. Those of them in the London branch would recall his term of office in 1941-43, when he conducted the affairs of the branch as President, with brilliance and thoroughness. They would notice that the term of office was from 1941 to 1943, two years instead of the customary one.

He had no doubt that his office as President of the Institute would be very fine indeed. He was a man with a very great determination. He fulfilled his duties and tasks with the utmost precision and exactitude, but at all times pursued a course of originality. He was very proud to have had the honour of proposing that toast, and he asked them to join with him in wishing long life and happiness and success to Mr. Templeton in his year of office as President of the Institute.

The President Replies

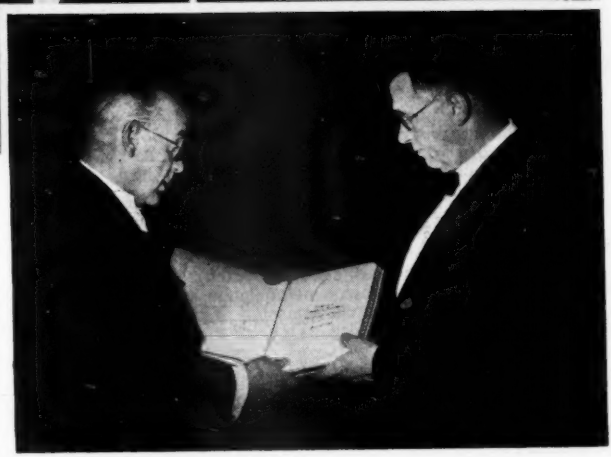
Responding to the toast, MR. TEMPLETON said it was one he thought they might very well have done without. It was their suggestion, for he was definitely

(*Concluded on page* 598)

AT THE I.B.F. SUPPER DANCE AND CABARET

(Left)—The President, MR. R. B. TEMPLETON, on his right MRS. TEMPLETON, and, on his left, MRS. J. W. GARDOM.

(Below)—MR. V. C. FAULKNER surrounded by the Belgian Delegation.



(Above, left to right)—MR. T. MAKEMSON, M.B.E.; MR. F. ARNOLD WILSON; MRS. NEWMAN; MR. NOEL NEWMAN, and MR. G. LAMBERT.

(Right)—MR. BARRINGTON HOOPER presenting MR. V. C. FAULKNER with a Stamp Album in recognition of his service of over 25 years as Editor of THE FOUNDRY TRADE JOURNAL.

Personal

MR. C. E. EDWARDS has been appointed sales manager of the Appleby-Frodingham branch of the United Steel Companies, Limited.

MR. A. E. BEAUCHAMP has been appointed to the board of Broom & Wade, Limited, manufacturers of air compressors, etc., of High Wycombe, Bucks.

MR. R. G. BRANDON has been appointed general sales manager of the lamp and lighting department of the British Thomson-Houston Company, Limited.

MR. SIDNEY A. GRIFFITHS has retired after 47 years with Baldwins, Limited, and Richard Thomas & Baldwins, Limited. He had been chief engineer of the company's Midland branch.

MR. R. T. PARDOE, sales manager for switchgear and transformers of Crompton Parkinson, Limited, has assumed the additional responsibility for the sales management of instruments and meters.

MR. A. BLACKWOOD, previously manager of Entwisle & Gass, Limited, Atlas Foundry, Bolton, has been appointed a director and general manager of the company. Mr. Blackwood is a member of the Institute of British Foundrymen.

LT.-COL. G. W. P. DAWES, who has been the F.B.I.'s district secretary at Nottingham for 19 years, has retired. He is succeeded by MR. K. J. WEBB, who was appointed assistant secretary in the Cambridge office of the Federation in 1947.

MR. J. H. LEIGHTON, foreman engineer at the Cleveland boiler plant of Dorman, Long & Company, Limited, has retired after 41 years' service with the company. MR. W. EVANS, foreman engineer at the company's power plant, has also retired after 55 years' service.

MR. PERCY WARDROBE, chairman of Wardrobe & Smith, Limited, Sheffield, has been elected president of the Crucible Steel Makers' Association in succession to MR. P. B. HENSHAW, joint managing director of Kayser, Ellison & Company, Limited, who has held the position since 1945.

MR. A. YARWOOD has resigned his positions as chairman and managing director of W. J. Yarwood & Sons (1938), Limited, shipbuilders, etc., of Northwich, Ches. MR. J. DON, a director of the Athel Line, Limited, has been appointed chairman and MR. J. BUCHANAN managing director of the company.

MR. J. W. GARTON has been appointed managing director of the Hoffmann Manufacturing Company, Limited, ball and roller bearing manufacturers, etc., of Chelmsford, Essex, and, consequent upon the appointment, has resigned from the chairmanship of the company. He has been succeeded as chairman by MR. S. G. NEWTON.

SIR GEORGE SCHUSTER, a member of the Government's committee on industrial productivity, has been appointed chairman of a committee appointed by the Secretary of State for Scotland and the Minister of Town and Country Planning to inquire into the qualifications required by town planners. Other members include DR. LEONARD T. M. GRAY, chairman and managing director of Miller & Company, Limited, iron-founders, etc., of Edinburgh.

THE HON. SHERIFF JAMES TENNENT has been appointed chairman of R. B. Tennent, Limited, iron and steel roll makers, of Coatbridge. Mr. Tennent, who will continue to act as managing director, was for five years Provost of Coatbridge and is a Deputy Lieutenant of the County of Lanark. He is an ex-president of the West of Scotland Iron and Steel Institute and an ex-chairman of the British Roll Makers' Association. He is deputy chairman and joint managing director of the British Rollmakers' Corporation, Limited, Wolverhampton.

Wills

MELLING, R. G., a director of Worsley Mesnes Ironworks, Limited, Wigan £35,366

LOUGHER, D. J., of Lougher & Company, mining engineers, of Pontypool, Mon £71,157

MUIRHEAD, JOHN, a director of Lithgows, Limited, shipbuilders and repairers, of Port Glasgow ... £116,562

BIGGART, W. M., chairman of Watson & McLean, Limited, chainmakers and electric welders, of Glasgow £18,333

HOBSON, J. W., general manager of Robert Stephenson & Hawthorns, Limited, locomotive builders, etc., of Newcastle-upon-Tyne £11,926

WAIN, FRANK, managing director of the Britannia Tube Company, Limited, Birmingham, and a director of Accles & Pollock, Limited, manufacturers of weldless steel tubes, etc., of Oldbury £187,965

HART, NORMAN, founder of Constable Hart & Company, Limited, public works contractors, etc., of Caxton Street, London, S.W.1, and a director of Kerrys (Great Britain), Limited, machinery and welding plant merchants, of Stratford, London, E.15 ... ... £15,137

Steel Production in May

Effect of Whitsun Holiday

Steel production in May reached an annual rate of 15,220,000 tons despite the incidence of Whitsun. This compares with a rate of 15,283,000 tons in April and 12,684,000 tons in May, 1947. The annual rate for last month, apart from the week affected by the holiday, reached a higher rate than ever previously.

Pig-iron production showed a further improvement, reaching an annual rate of 9,552,000 tons in May, compared with 9,433,000 in April and only 7,378,000 tons a year ago.

	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
	Tons.	Tons.	Tons.	Tons.
1948—January ..	167,800	8,726,000	280,600	14,589,000
February ..	176,300	9,169,000	289,400	15,049,000
March	178,900	9,303,000	290,700	15,117,000
April	181,400	9,433,000	293,900	15,283,000
May	183,700	9,552,000	292,700	15,220,000
1947—January ..	150,100	7,806,000	239,800	12,470,000
February ..	126,200	6,560,000	206,300	10,726,000
March	123,100	6,400,000	196,000	10,190,000
April	139,200	7,238,000	236,400	12,294,000
May	141,900	7,378,000	243,900	12,684,000

Birthday Honours List

Awards to Industrialists and Scientists

Many awards to people associated with the iron and steel and allied industries were announced in the Birthday Honours List published last Thursday. Brief notes on some of the principal awards are given below.

Knights Bachelor

MR. ROBERT CRICHTON, chairman of the West Cumberland Industrial Development Company, Limited, joint vice-chairman of the Lancashire Steel Corporation, Limited, and a director of Rylands Bros., Limited.

MR. ELLIS HUNTER, president of the British Iron and Steel Federation, and deputy chairman and managing director of Dorman, Long & Company, Limited. He is also on the boards of many other companies.

MR. HAROLD ERNEST GEORGES WEST, managing director of Newton Chambers & Company, Limited.

Order of the British Empire

C.B.E.

MR. AMBROSE CALLIGHAN, general secretary, National Union of Blast Furnacemen, Ore Miners, Coke Workers and Kindred Trades; MR. HERBERT WILLIAM CREMER, consulting engineer, president of the Institute of Chemical Engineers; MR. ALAN ARNOLD GRIFFITH, F.R.S., research engineer, Rolls-Royce, Limited; MR. WILLIAM FREDERICK HIGGINS, superintendent, physics division, National Physical Laboratory; DR. WILLIAM RICHARD JONES, Professor Emeritus of the University of London and of the Imperial College of Science and Technology, for services to the Board of Trade; DR. ALEXANDER KING, Chief Scientific Liaison Officer, Office of the Lord President of the Council, MR. HERBERT BABINGTON ROBIN ROWELL, chairman of R. & W. Hawthorn, Leslie & Company, Limited, Newcastle-on-Tyne; MR. WILLIAM LEONARD TREGONING, Chief of Industry Division, Commerce and Industry Bipartite Control Group, Control Commission for Germany (British Element).

O.B.E.

MR. GEORGE RONALD BARCLAY, chairman, Watford District Committee, Eastern Regional Board for Industry, chairman of Wild-Barfield Electric Furnaces, Limited; MR. WILFRED BLACKWELL BEARD, general secretary, United Patternmakers' Association; DR. WALTER THEODORE KARL BRAUNHOLTZ, secretary, Institution of Gas Engineers; MR. SYDNEY TOWNSEND CLARK, Production and Supplies Officer, British Iron and Steel Federation; MR. ROBERT JAMES DIPPY, Senior Principal Scientific Officer, Ministry of Supply; MR. GEORGE ANTHONY GARDNER, chief structural engineer, Ministry of Works; MR. CHARLES HENRY GRIFFITHS, assistant director, Engine Research and Development, Ministry of Supply; MR. GEORGE NELSON HADEN, chairman and managing director, G. N. Haden & Sons, Limited, heating and electrical engineering contractors; MR. JOB HOLLAND, for services to the Refractories Industries (Silicosis) Scheme; MR. NATHAN ISAACS, director, Derby & Company, Limited; MR. CYRIL FREDERICK JOHNSTON, director, Gillett & Johnston, Limited, bell-founders, Croydon.

MR. WILLIAM MITCHELL, chief marine engineer, Vickers-Armstrongs, Limited, Barrow-in-Furness; MR. JAMES PATTON, director and general manager, Smith's Dock Company, Limited, South Bank, Middlesbrough; MR. HAROLD SHAND, lately director, G. A. Harvey & Company, Limited, Greenwich; MR. ALFRED EDWARD STILLWELL, chief industrial relations officer, Ministry of Labour and National Service; MR. WILLIAM JOHN FRANCIS WELLARD, superintending mechanical and electrical engineer (Grade II), Air Ministry; DR. GILBERT DUNCAN WEST, Associate Professor of Physics, Military College of Science.

M.B.E.

MR. WILLIAM HENRY DANN, chief designer, Saunders Engineering & Shipyard, Limited, Beaumaris, Isle of Anglesey; MR. WILLIAM HENRY DARLINGTON, engineer, Metropolitan-Vickers Electrical Company, Limited; MR. RICHARD NORMAN HADWIN, chief vibration engineer, De Havilland Propeller Company, Limited; MR. LAWRENCE METCALFE HORWILL, assistant chief draughtsman, Yarrow & Company, Limited, Glasgow; MR. WILLIAM FLEET HUSON, secretary, Southern Regional Board for Industry; MR. FREDERICK GEORGE MARTIN, office manager, Amalgamated Engineering Union; ALDERMAN RICHARD O'DOWD, vice-chairman, Central Committee, British Iron and Steel Kindred Trades Association; MR. WILLIAM GEORGE PATTERSON, deputy general works manager, Siemens Bros. & Company, Limited, Woolwich; MR. WILLIAM EDDINGTON PEEL, works superintendent, fire control department, R. W. Crabtree & Sons, Limited, Leeds; MR. DONALD HENRY PERKINS, chief development engineer, Henry Hughes & Son, Limited, Barkingside, Essex; MR. JOHN MAGNUS PLATT, technical manager, instrument department, Laurence Scott & Electromotors, Limited; MR. FELIX ARTHUR ROGERS, director and secretary of trade associations attached to the British Electrical and Allied Manufacturers' Association; MR. FREDERICK WILLIAM SMITH, higher executive officer, D.S.I.R.; MR. GEORGE MAURICE TOMLIN, chief development engineer, Salford Electrical Instruments, Limited; MR. DAVID WALKER, chief draughtsman, engine department, Fairfield Shipbuilding & Engineering Company, Limited, Govan, Glasgow.

Consultation in Industry

Mr. R. Lloyd Roberts, chief labour officer of Imperial Chemical Industries, Limited, is to take up a special appointment in the Ministry of Labour. His work will be to stimulate the development of Joint Production Committees or similar joint consultative machinery at factory level. During the war he served in the Ministry as under-secretary for personnel management and welfare. Mr. Roberts is the immediate past-president of the Institute of Personnel Management.

The appointment follows a recent observation by the Chancellor of the Exchequer that in the absence of any substantial increases in labour and productive machinery much more would depend on industrial efficiency; he attached new significance to the utmost co-operation between employers and the employed.

I.B.F. Annual Dinner

(*Continued from page* 594)

against it for a number of reasons. One was that on that day he thought he had made eight speeches, and he had never made so many in all the years that he had been associated with that industry. Another reason was that he felt that the National Federation of Amalgamated Public Speakers might take a rather poor view of such unrestricted practices.

He had thought he could get up and say, "Thank You," and sit down, but it was not as easy as that. Speech making was a funny business, once it got under one's skin it was like other forms of vice, very difficult to control. When he became their Junior Vice President two years ago he realised he would have to do that sort of thing, so he bought all the books he could on public speaking, went to evening classes and night school and read the speeches of famous men. About a week ago he read the speech which Lord Halifax made to the Pilgrim Society in America when he was our ambassador in Washington. He related that when he knew he had to get up and speak in the House of Commons for the first time he was petrified with fear and went to Lord Balfour for advice. Lord Balfour said, "My dear fellow, don't worry. All you have to do is to get up in the House and speak whenever you can. And while you are on your hind legs, speak, and keep on speaking for as long as you can. After you have done that once or twice you will lose all sense of humanity and any sympathy or mercy that you had for your audience."

He did not propose to emulate Lord Halifax, but it did remind him of a circumstance which happened in November last year when he made his maiden effort at that sort of thing. When the dinner was over and he was being congratulated, mainly as a result of the applied moisture content, among the group was that magic apostle of continuous mechanised production, Mr. John Gardom. When the back slapping was all over, Mr. Gardom said, "Now that is all very nice and fine. But the point we have to remember is this: Can he keep it up?"

He rather shared that fear that he could not keep it up. But he had kept it up to thank them, the delegates and everyone who had done so much to make the evening a success. They had worked under very difficult conditions, and he thought they had done a grand job of work. Also he would like to express his great appreciation of the Management of the Café Royal for the excellent way in which they had contributed to their needs.

NEARLY 1,000 BRITISH FIRMS will be represented at the 1948 British Exhibition in Copenhagen to be held from September 18 to October 3. It will be the largest display of British goods ever held in Denmark or Scandinavia. The Exhibition, which is designed to encourage the export of British goods to the Scandinavian countries, is organised by the British Import Union in co-operation with the Federation of British Industries and with the approval of H.M. Government and the Danish Government.

British Standards Institution

The Monthly Information Sheet for April lists under "Standards Withdrawn" the following:—

B.S. 207:1924, special brass ingots and castings; B.S. 208:1924, special brass castings; B.S. 382/3:1940, bronze (gunmetal) ingots and castings for general engineering purposes; B.S. 421:1931, phosphor bronze castings for gear blanks; B.S. 897/8:1940, leaded gunmetal castings and castings; B.S. 900/1:1940, leaded gunmetal ingots and castings; B.S. 920:1940, naval brass die castings; B.S. 932:1940, brass gravity die-castings; B.S. 960/5:1941, leaded bronze castings and ingots; B.S. 1,021/8 and 1,158/9:1944, copper alloy ingots and castings; B.S. 1,029/30:1942, silicon bronze ingots and castings; B.S. 1,031/2:1942, Aluminium bronze ingots and castings; B.S. 1,058/61:1942, phosphor bronze and leaded bronze ingots and castings; B.S. 1072/3:1942 (see 1,031/2), high tensile aluminium bronze ingots and castings. (The above have been replaced by B.S. 1,400: 1948, copper alloy ingots and castings, 7s. 6d.)

Amongst new work started there are the following:—Aluminium alloy ingots and castings for aircraft purposes (revision of existing British Standards in aircraft series and transfer of D.T.D.'s); inspection and testing procedure for light alloy ingots and castings for aircraft; code of inspectional procedure for steel castings, and gas burning canteen equipment.

The following draft standards have been circulated for comment:—CJ4,761, cast iron sectional rectangular tanks; CJ5,273, tung oil (revision of B.S. 391); CJ5,486, high silicon iron castings; CJ5,662, safety precautions in the use of laboratory chemicals for metallurgical analysis; CJ5,697, heat resistant alloy steel castings; CJ5,698, mild steel castings of high magnetic permeability; CJ5,699, corrosion resistant alloy steel castings; CJ5,853, methods for verification of testing machines and CJ5,882, method for the determination of silicon in plain carbon steels, low alloy steels and cast irons (absorptiometric method).

I.B.F. Annual General Meeting

(*Continued from page* 590)

publication of the lecture. One was impressed, he said, not only by the bibliography given in the lecture but also by Dr. Schwartz's own knowledge of the subject; he had dealt with the metallurgy of it, he had treated the chemistry and physics of the processes, and had almost gone into the thermodynamics of the various reactions in the production of black heart malleable.

(The vote of thanks to Dr. Schwartz and Mr. Peace was carried with enthusiasm.)

Mr. PEACE, responding, said Dr. Schwartz was very disappointed indeed not to be able to deliver the lecture in person; but he would be very gratified by the way in which it had been received and by the complimentary remarks which had been made by Mr. Newman and Mr. Sheehan. Mr. Peace, for his own part, expressed his own pride in having the opportunity to read the lecture on behalf of Dr. Schwartz.

Company News

(Figures for previous years in brackets)

Tilling-Stevens—Dividend of 5% (same).

Sanbra—Interim dividend of 7½% (same).

Keith Blackman—Dividend of 20% (same).

Triplex Foundry—Dividend of 10% (7½%).

Hewitt Bros.—Interim dividend of 5% (same).

G. N. Haden & Sons—Dividend of 25% (same).

Bluemel Bros.—Interim dividend of 2½% (same).

Glacier Metal Company—Dividend of 7½% (same).

Herbert Terry & Sons—Final dividend of 20% (same).

Vacuum Brake Company—Dividend of 10% (same).

C. Lindley & Company—Interim dividend of 5% (same).

Wailes Dove Bitumastic—Interim dividend of 7½% (same).

Barton & Sons—Final dividend of 4%, making 7% (same).

Associated British Engineering—Dividend of 12% (same).

Hale & Hale (Tipton)—Interim dividend of 5% (same).

R. A. Lister & Company—Interim dividend of 5% (same).

Weyburn Engineering Company—Interim dividend of 5% (same).

Henry Hope & Sons—Dividend of 10% on increased capital (7½%).

Vent-Axia—Final dividend at the rate of 150%, making 250%.

Geo. Adlam & Sons—Final dividend of 37½%, making 50% (nil).

Metal Box Company—Final dividend of 15%, making 20% (same).

General Cable Manufacturing Company—Interim dividend of 20% (same).

Consett Iron Company—Final dividend of 7½% (10%), making 12½% (same).

Spurling Motor Bodies—Final dividend of 25% (same), making 37½% (35%).

W. G. Allen & Sons (Tipton)—Final dividend of 7½% (5%), making 10% (7½%).

Coley Metals—Dividend of 10% and bonus of 2½% on doubled capital (dividend of 10%).

Thomas Hardman & Sons—Final dividend of 13¾%, making 21¼% (16¼% and bonus of 5%).

N. Greening & Sons—Final dividend of 12½% (10%), making 17½% (same, including bonus of 5%).

Revo Electric Company—Final dividend of 12½%, making 17½% (same) and bonus of 10% (same).

Associated Belting Companies—Dividend of 5% for the period July 1, 1947, to March 27, 1948 (3½%).

Darlington Wire Mills—Final dividend of 15%, less tax (17½% net), making 25% gross (25%, tax free).

Johnson, Matthey & Company—Final dividend of 3% (9%) and bonus of 6% (nil), making 12% (same).

Hill Top Foundry Company—Dividend of 100% (80%). The company was made public in September, 1947.

Grayson Rollo & Clover Docks—Dividend for 1947 of 10% (same) and of 2½% for the three months ended March 31, 1948.

Hattersley (Ormskirk)—Final dividend of 11½% (same) and bonus of 7½% (2½%), making 25% (20% and special tax-free distribution of 2½% from profits on sales of investments).

Harrison, McGregor & Guest—Trading loss for 1947, £32,078; net loss, £57,953; forward, £5,329. (Net profit for the 15 months to December 31, 1946, £9,187; interim dividend of 2½%.)

Milner's Safe Company—Group accounts for the year ended March 31 show net profit applicable to parent company, £9,324; dividend of 7½% (same and bonus of 2½%); forward, £23,651.

Aron Electricity Meter—Profit for the year to March 31, £75,624; to income tax, £48,335; available, £27,289 (£18,822); to general reserve, £12,500; dividend of 15% (same); forward, £25,498 (£23,244).

Dubilier Condenser (1925)—Net profit to March 31, after income tax, £74,951 (£22,578); dividend of 20% (same); to general reserve, £20,000 (nil); dividend reserve, £20,000 (nil); forward, £53,672 (£32,687).

Bentley Engineering Company—Net profit for 1947, after taxation, £53,190 (£51,740); dividend of 40% (same); to contingency reserve pending agreement of E.P.T. liability, nil (£15,000); forward, £46,716 (£26,400).

Bairds & Scottish Steel—Trading profit for 1947, including income from investments, after taxation, depreciation, contingencies, and directors' fees, £157,836 (£151,270); dividend of 10% (same); forward, £155,797 (£125,011).

John Hetherington (Holdings)—Gross income for the year to March 31, £5,354 (£5.252); to income tax, £1,999 (£1,923); directors' fees, £300 (£594); expenses, £770 (£373); profit, £2,285 (£2,362); dividend of 3.3% (2½%); forward, £758 (£695).

Ward & Goldstone—Net profit for the year ended March 31, after depreciation, tax, etc., £240,124 (£128,179); final dividend of 30%, making 50% (same); to provision for future taxation, £65,000 (£30,000); forward, £299,607 (£153,514).

Alliance Aluminium Holdings—Revenue for the six months to December 31, 1947, £17,203 (£22,935 for the year); to loan interest, £2,320 (£4,640); director's fee, £131 (£262); general expenses, £110 (£172); income and profits tax, £7,303 (£8.420); forward, £102,710 (£95,371).

Light Production Company—Trading balance for the 11 months to March 31, £13,406 (£3,664 for the year); other income, £128 (£154); E.P.T. recoverable. nil (£15,500); to depreciation, £4,118 (£3,000); written off premises, £100 (£228); tax, £5,050 (£3,750); dividend of 10% (same); forward, £22,858 (£21,480).

Sheffield Twist Drill & Steel Company—Net profit for 1947, £76,639; to tax on profits, October 2 to December 31, £44,000; preference dividend, £3,094; ordinary dividend at the rate of 33⅓% per annum for the period October 2 to December 31, £16,042; forward, £13,503. The company was made public in December, 1947.

Anderston Foundry Company—Net profit to March 31, £17,339 (£13,393); to interim dividend of 1s. 6d., £1,237 (same); stock depreciation, £5,000 (nil); general reserve, £2,500 (same); final dividend of 7s. 6d. per share, making 9s. (same), £6,187; directors' fees, £840 (same); benevolent fund, £200 (same); forward, £23,552 (£22,177).

Howard & Bullough (Securities)—Gross profit to March 31, £71,837 (£69,924); dividend from subsidiary, £155 (nil); to taxation, £33,490 (£31,943); directors' fees, £1,000 (same); crediting premium on redemption of Norwegian Bonds, £1,770 (nil); net profit, £39,273 (£36,980); transfer from dividend reserve, £3,000 (£6,000); dividend of 5% (same); forward, £581 (£933).

Telephone Manufacturing Company—Net profit for 1947, after depreciation, etc., £103,918 (£21,784); subsidiary dividends in respect of previous years, £3,427 (nil); adjustment of Government contracts, £57,242 (nil); E.P.T. recoverable, nil (£34,000); to tax, £128,782 (£38,461); general reserve, £10,731 (nil); final dividend of 6½%, making 9% on £500,000 capital (9% on £385,000 capital); forward, £9,383 (£9,059).

Stancroft—Trading profit to March 31, after management remuneration, £106,998; rent and interest, £548; to profits prior to acquisition, £25,617; directors' fees, £739; fixed assets depreciation, £4,338; net profit. £76,852; to tax, £47,854; preference dividend for six months, £1,375; ordinary dividend of 37½% for nine months (equivalent to 50% for year), £20,625; forward, £6,998. The company was made public in January, 1948.

London Electric Wire Company & Smiths—Trading profit for 1947, including profits of subsidiaries to extent of dividends declared, £529,868; income from investments (gross), £40,617; fees. £31; to depreciation, £67,691; directors' fees, £1,050; taxation, £344,017; provisions, £39,990; net profit, £117,768; to revenue reserves, £60,000; final dividend of 7½%, making 10% (same, including bonus of 2½%); forward, £150,898 (£147,254).

Eva Bros.—Trading profit to March 31, £68,621 (£42,439); surplus on assets, £520 (£11); to depreciation. £8,580 (£5,016); directors' remuneration, £5,000 (£4,600); profits tax, £9,200 (£6,000); income tax, £21,300 (£11,500); net profit, £25,061 (£15,334); to general reserve, £5,000 (£1,050); preference dividend, £2,173 (£1,782); final ordinary dividend of 42%, making 70%, £10,433 (£4,235); forward, £15,722 (£8,267). The company was made public in July, 1947.

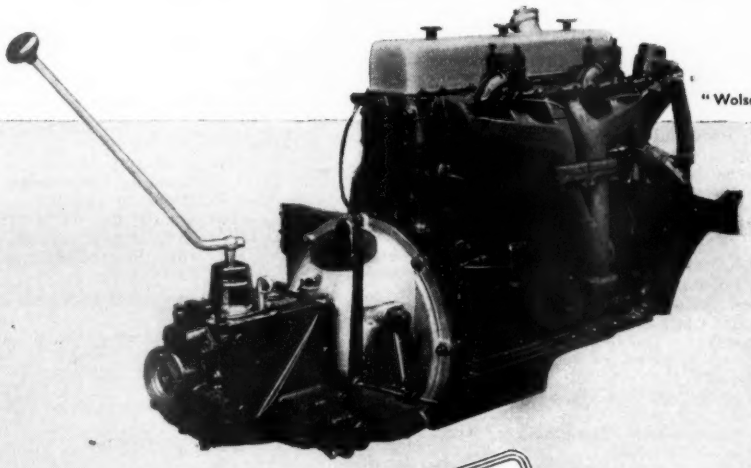
Meters—Net trading profit for the year ended March 31, after taxation and management expenses, £36,434 (£28,633); investment income, £5,052 (£5,343); to depreciation, £15,000 (same); directors' fees, £225 (£242); net profit, £26,261 (£18,734); transferred from deferred repairs reserve, £2,610 (£2,410); to loss on realisations of investments, nil (£10,305, less £10,000 transferred from general reserve); preference dividend, £4,396 (£3,970); final ordinary dividend of 6%, making 10% (same and jubilee bonus of 5%); general reserve £10,000 (nil); forward, £16,901 (£13,424).

International Twist Drill Company—Group net trading profit for 1947, £106,174 (£83,015); rents and dividends, £121 (£25); to depreciation, £13,918 (£8,543); rents. policy premium, etc., £500 (£704); directors' fees, £1,350 (£1,100); directors' commission, £7,273 (£6,354); income tax "A," £384 (£276); profits tax, £20,054 (E.P.T. £29,156); income tax, £25,114 (£10,608); net profit, £37,701 (£26,298); non-recurring income and other adjustments, £5,795 (nil); to general reserve, £10,000 (nil); final dividend of 25%, making 125% (same); forward, £43,593 (£39,613).

Allen West & Company—Trading profit for the year ended January 31, £307,281 (£180,662); additional trading profits relating to previous years, nil (£44,862); dividends and interest, £5,881 (£5,757); to tax, £163,635 (£104,043); debenture interest, nil (£7,108); directors' fees, £3,000 (same); pension fund, £10,022 (£8,757); depreciation and amounts written off, £30,574 (£20,000); net profit, £105,931 (£88,373); to reserve for possible fall in value of materials, £50,000 (nil); general reserve, nil (£20,359); dividend of 7½% and bonus of 2½% (same); forward, £113,860 (£91,445).

Goodlass Wall & Lead Industries—Profits of group companies and dividends received in 1947, £1,462,747 (£1,113,705); to tax, £931,291 (£828,280); capital redemption reserve fund, £50 (£2,622); preference dividends to outside shareholders, £6,113 (£6,138); net profit of parent company, £525,293 (£361,541); exceptional surplus on stock realisations of £334,425 (£84,876) is placed to reserve; to preference dividend, £51,823 (same); general reserve, £350,000 (£140,000); preferred ordinary dividend, £17,395 (£17,394); ordinary dividend of 15% (same); forward, £146,338 (£139,649).

Ambrose Shardlow & Company—Trading profit for the year ended March 31, before depreciation, £251,925 (£156,453); provision for repayments to Government departments not required, nil (£12,640); transfer fees. £15 (£27); profit on sale of plant, etc., nil (£461); interest on tax reserve certificates, £88 (£394); E.P.T. recoverable, £15,371 (£394); to depreciation, £35,474 (£25,041); interest on loan, £1,087 (£1,249); loss on sale of plant, etc., £352 (nil); directors' fees, £917 (£500); taxation, £95,251 (£72,750); reserve for additional cost of replacing fixed assets, £60,000 (£25,000); net profit, £74,318 (£45,435); to general reserve, £50,000 (£20,000); final dividend of 10%, making 12½% (same); forward, £22,977 (£17,909).



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New Patents

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each. The numbers given are those under which the Specifications will be printed, and all subsequent proceedings will be taken.

594,051 FIERZ, H. Method of constructing joints in trusses made of structural tubes, and metal tubes for such constructions.

594,064 ELECTRO METALLURGICAL COMPANY. Compositions of matter for treating molten ferrous metals and methods of producing iron and steel therewith.

594,076 CARNEGIE-ILLINOIS STEEL CORPORATION. Surface lubrication of metal products.

594,152 MAGNESIUM ELEKTRON, LIMITED, EMLEY, E. F., and FOX, F. A. Treatment of magnesium and magnesium base alloys.

594,199 KRUSE, P. Apparatus for conditioning steel blanks.

594,200 ROBINSON & SON, LIMITED, T., and ROBINSON, C. S. Drive for roller mills.

594,237 CARNEGIE-ILLINOIS STEEL CORPORATION. Automatic positioning and welding.

594,283 SUPERIOR STEEL CORPORATION. Annealing of bimetallic products.

594,304 ELECTRO MANGANESE CORPORATION. Electrowinning of manganese.

594,345 RUDOLF, H. T. Method of operating blast furnaces.

594,412 UNITED STATES PIPE & FOUNDRY COMPANY. Centrifugal metal casting.

594,419 BUDD MANUFACTURING COMPANY, E. G. Method of and machines for making curved profiles of sheet metal or other material.

594,500 GENERAL ELECTRIC COMPANY, LIMITED, and RICHARDS, S. W. Electric signalling systems for use, for example, in mines.

594,576 CARRIER ENGINEERING COMPANY, LIMITED, and SAINTY, C. L. Methods of and apparatus for separating solid and liquid particles from fluids.

594,600 FORD MOTOR COMPANY, LIMITED. Moulding method and apparatus.

594,620 STERLING INDUSTRIES, LIMITED, and THOMAS, P. E. Flexible metal pipes.

594,699 UNITED CHROMIUM INC., STARECK, J. E., and CORLISS, L. M. Methods of producing surface conversion coatings on zinc.

594,735 GUEST, KEEN & NETTLEFOLDS, LIMITED, and JOYNT, J. C. Screw and nut fastenings.

594,762 SILVERCROWN, LIMITED, and SCHMERLING, G. Coating of the surfaces of ferrous metals.

594,783 WESTERN ELECTRIC COMPANY, INC. Preparation of silicon ingots.

594,832 SYMMONS, A., and HITCHCOCK, N. E. F. Treatment of castings and other metal parts to render them non-porous.

594,855 MITCHELL ENGINEERING, LIMITED, and MACPHEE, A. Ball tube mills.

594,909 COULTHARD & COMPANY, LIMITED, W., and COULTHARD, W. Die-casting machines.

Obituary

MR. THOMAS CUTLER, of Archibald Baird & Son, Limited, colliery engineers, foundrymen, etc., of Hamilton, Scotland, died last week.

SIR HENRY BEYER ROBERTSON, who was chairman of the Brymbo Steel Company, Limited, Wrexham, and a director of Baldwins (Holdings), Limited, and other companies, has died at the age of 86.

MR. SYDNEY SMITH, managing director of the Wellman Smith Owen Engineering Corporation, Limited, who died on May 30, had been unwell for some time. He had been connected with the Wellman group for many years, and just over a year ago succeeded his brother, the late Mr. James Foster-Smith, as managing director.

MR. CHARLES PAYNE, a former managing director of Harland & Wolff, Limited, Belfast, died on June 6 at the age of 77. He had been ill for a considerable time. Mr. Payne entered the service of Harland & Wolff, Limited, as a junior draughtsman in 1896. In July, 1918, he was appointed Managing Director of Shipbuilding for the Admiralty national yards, and at the end of hostilities he returned to Belfast, finally retiring from the board of Harland & Wolff, Limited, in 1939.

United Kingdom Tin Position

The Ministry of Supply has released the following figures showing the United Kingdom tin position for the month of April:—

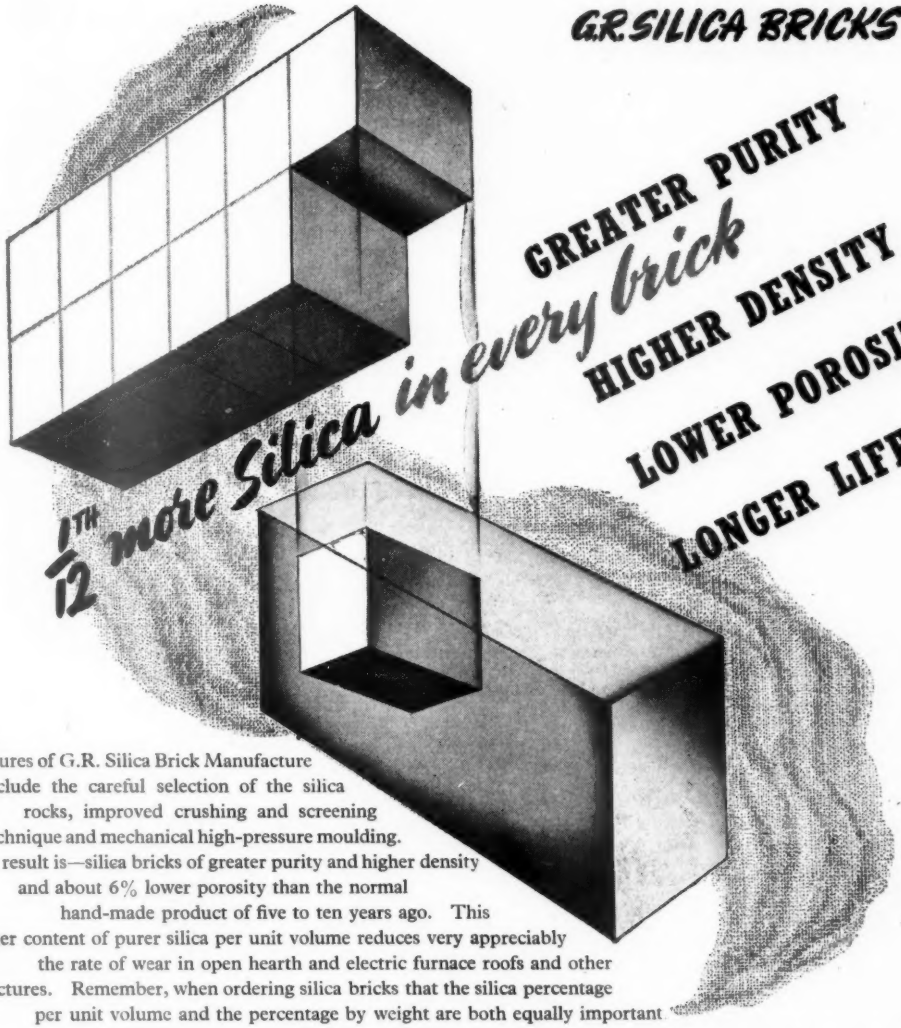
	Ministry.	Consumers.
	Long tons.	Long tons.
TIN METAL:		
Stocks at April 1	7,347	2,866
Arrivals	—	—
Production (purchased from smelters)	306	—
	7,653	2,866
Deliveries:		
To U.K. consumers .. 1,999	—	1,999
For export .. 136	2,135	—
	—	4,865
Consumption	—	2,166
Stocks at April 30	5,518	2,699*
TIN ORE (Tin content):		
Stocks in U.K. at April 1	4,296	—
Stocks in U.K. at April 30	4,291	—

* Calculated. Reported 2,752 tons.

Allocations of Tin Metal

Final allocations of tin metal, totalling 4,715 long tons, for the first half of 1948 have been made by the Combined Tin Committee. They bring the quantity allocated to meet requirements for the first six months up to 39,486 long tons. The final allocations include 2,550 tons to the United States, making 20,400 tons for the period, 680 (5,440) tons to France, 350 (2,800) tons to India, and 270 (2,175) tons to Canada.

G.R. SILICA BRICKS



Features of G.R. Silica Brick Manufacture include the careful selection of the silica rocks, improved crushing and screening technique and mechanical high-pressure moulding. The result is—silica bricks of greater purity and higher density and about 6% lower porosity than the normal hand-made product of five to ten years ago. This higher content of purer silica per unit volume reduces very appreciably the rate of wear in open hearth and electric furnace roofs and other structures. Remember, when ordering silica bricks that the silica percentage per unit volume and the percentage by weight are both equally important

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Raw Material Markets

Iron and Steel

Steel plants are the chief beneficiaries of the increased blast-furnace outputs, deliveries to the foundries being still on a restricted scale. In the face of a heavier demand, production of hematite and foundry grades remains static, and scarcity of these sorts is certainly limiting the output of castings, for which there is an extensive demand. Engineering foundries, not being restricted to one particular grade, are faring better than the producers of light castings, who are almost wholly reliant on high-phosphorus iron, which is still very scarce.

The arrival of a few cargoes of Belgian steel semis has provided a welcome supplement to home-produced supplies of re-rolling material, and improved deliveries of heavy billets, blooms, and slabs have exercised a favourable influence on the operation of the re-rolling mills. But the scarcity of small billets is still a bottle-neck which calls for immediate attention, and it is noticeable that there is no decline in the avidity which re-rollers display in the acquisition of available tonnages of defective billets, sheet bars, crops, etc.

Good outputs of all classes of finished steel products are being put into circulation promptly. Transport difficulties have been largely overcome and consumers are receiving their full authorised tonnages. These, of course, do not measure up to full requirements, and there is constant pressure for increased allocations. Shipbuilders, in particular, complain that they have derived no benefit from the bigger outputs of plates, etc., but there are many other industries whose needs are equally clamant and, in the present state of supply and demand, it is impossible to please everybody. Much bigger tonnages of steel are going abroad as indirect exports by the metal-using industries, and this trade is being sedulously fostered by the Government. Home requirements, however, are very extensive, and much interest is now focused on the allocated tonnages for Period III. Plates and sheets are in heavy demand, while the section and rail mills are assured of a steady run until the late autumn.

Non-ferrous Metals

The zinc supply situation in the United Kingdom, which only a few weeks ago looked far from healthy, is improving; partly because shipments have come forward more frequently, and partly because demand has eased to some extent. The price in this country is high in comparison with the American quotation, but, unfortunately, it is nothing new for the British consumer to be obliged to pay over the world price—an aspect of bulk purchasing which may be very agreeable from the Government's point of view, but which certainly does not appeal to consumers. Since lead was advanced to 17½ cents per lb. in the U.S., it has been thought that zinc would be increased to perhaps 14 cents, and the Ministry of Supply may have this in mind, while waiting for a change. But that is a poor way to run a metal market, and the more one sees of bulk purchasing the more one feels that reversion to the free-market system is overdue. The Minister of Supply has said that no decision about reopening the London Metal Exchange can be taken because metals are in short supply. But is not this more apparent than real? It is true that the American Government is occupied in stockpiling, but it would be wrong to subscribe too wholeheartedly to the belief that, so long as this continues, no decline in values is possible. A recent report suggests that some copper has been secured already for this special reserve, and its acquisition does not seem to have created any disturbance.

The great need is that freedom should be handed back to the non-ferrous metal trade while confidence in prices still remains, and if the Government delays action much longer, waning confidence will precipitate a situation in which the selling, which is bound to be seen when the market opens, will drive values down too far. That, however, is not the worst that could happen, for the Government must pass over some part at any rate of its holding to the trade before retiring from its present career as a merchant, and if potential buyers are aware of a price reduction just round the corner, they will only be prepared to buy well below the current quotations. In the interests of the taxpayer, who would presumably be called upon to foot the bill, the Government would be well advised to begin now to negotiate with the trade for the transfer of its holding in non-ferrous metals. Demand for non-ferrous metal products has already begun to decline in this country and, even in the United States, the fabricators can now offer much quicker delivery than was the case a few months ago.

Contracts Open

The dates given are the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Cheltenham—Contract No. 1: Supply and laying of about 7,000 yds. of 4-in. and 3-in. steel and spun-iron mains, etc. Contract No. 2: Supply and erection of electrically-driven centrifugal pumps, for the Rural District Council. Mr. J. H. Haiste, consulting engineer, 4, Queen Square, Woodhouse Lane, Leeds. (Fee £3 3s., returnable.)

Depwade, June 25—Construction of 6-in. stoneware and cast-iron sewers, etc., for the Rural District Council. A. P. I. Cotterell & Son, engineers, 54, Victoria Street, Westminster, London, S.W.1. (Fee £3 3s., returnable.)

Newtownards, Co. Down, July 21—Construction of a spun-iron water main, for the North Down Waterworks Joint Board. R. Ferguson & S. McIlveen, consulting engineers, 6, University Square, Belfast. (Fee £3 3s., returnable.)

Pembroke, June 25—Provision and laying of approx. 6¼ miles of 4-in. and 3-in. spun-iron pipes, etc., for the Rural District Council. J. Owen Parry & Lewis, consulting engineers, Ammanford. (Fee £5 5s., returnable.)